P Med. (A)
Edward M. Holden
Biological & Medical Serials

Published Quarterly. Free by Post.

Annual Subscription 10s., payable in advance.

2s. 6d. APRIL, 1862. No. XI.

ARCHIVES

3#11

OF

MEDICINE:

A RECORD OF PRACTICAL OBSERVATIONS, AND ANATOMICAL AND CHEMICAL RESEARCHES CONNECTED WITH THE INVESTIGATION AND TREATMENT OF DISEASE.

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VOL. III.

Illustrated with wood-cuts, lithographs, and coloured plates carefully copied from Nature.

STORAGE

LONDON:

JOHN CHURCHILL, NEW BURLINGTON STREET.

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PRINTED BY HARRISON AND SONS, ST. MARTIN'S LANE, W.C.

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oscillation of the nerve-stream. Thence he concludes that the nerves retain their irritability as in the normal state. Kühne denies that these conclusions are logical; and he asserts that the nerve-trunks, in spite of their normal electromotor relations, entirely lose their irritability after Curari poisoning. He does not consider that the experiments of Bernard and Kölliker prove that the palsy creeping up towards the centres attains to the nerve-trunks. To establish this he adopts a method the reverse of that hitherto employed, and observes the gradual recovery of the animals from the effects of the poison. He first ascertained what was the minimum dose with which a frog could still recover, and found it to be 0·00004 gr.,—a dose sufficient, in an hour, completely to paralyse it. Usually, at the expiration of twenty-four hours the first weak contractions were seen to return on exposure of the nerves to strong induction strokes. The nerves of animals that, to external observation, appeared quite palsied, behaved very differently accordingly as the electrodes were applied to a central or a peripheral spot. Some muscles which responded to no kind of irritation applied to the nerve-trunks, went into violent general contractions on the application of the minimum stream to their nerve-holding sections. As poisoning is ceasing, those nerve ends which lie in the muscle acquire their irritability earliest. But this also shows that the trunks must be paralysed. If the nerve be examined a little later, a strong induction stroke applied to that portion of the sciatic which lies nearest to the muscle will be found to cause contraction, whilst a stroke of equal intensity applied to the plexus itself, produces no effect. If examined with the Rheochord, the normal curve of irritability will be discovered in the peripheral portions of the nerve, fading away from a given spot till a point is reached in the direction of the centres beyond which all induction strokes are powerless. Thus the trunk of the nerve, even in poisoning with minimal doses, is paralysed in its whole extent; and this condition, in the return to the normal state, gradually vanishes from periphery to centre. Thus a nerve may retain its normal electromotive properties, although quite incapable of passing into the excited state and of inducing muscular contraction.

Kühne's theory of Curari-poisoning is, then, as follows:— The poison is resorbed by the blood-vessels, and first paralyses a portion of the intramuscular nerve, close to its extreme end. Then the motor nerves are progressively paralysed from periphery to centre in their whole extent. Recovery ensues in the same order as paralysis. After poisoning has long persisted the ultimate end of the nerve participates in it. The intimate

and extended relation that the muscular capillaries bear to the intramuscular nerves probably explains the facility with which the poison affects the nervous system when applied through this channel. Indeed, it admits of little doubt that the blood changes in the muscle are the greatest means of nutrition in its entire course. Brown-Sèquard has shown, that if the vessels of the leg of a warm-blooded animal be tied, and a large tract of the nerve isolated, irritation of the latter causes no movement of the limb, although the muscle remains directly irritable. If blood be then again admitted, the nerve regains its power in a few minutes. Now, in so far as the anaemic nerve-trunk loses its irritability along its entire course from the intramuscular distribution towards the centre, this experiment stands parallel to Curari poisoning. To test this, Kühne repeated Brown-Sèquard's experiments, testing the different portions of the nerve after the readmission of blood. In a few minutes the piece of nerve next the hollow of the knee was found irritable; but a point a little higher up the nerve was still paralysed. Somewhat later, irritability reappeared also here, at first feebly, then decidedly.

A collateral subject has also been carefully investigated by Kühne, namely, that of the nature and physiological bearings of Rigor Mortis. We should scarcely be doing him justice without a brief notice of his contributions in this direction. Without going into the opinions of the authors who have written on this subject, it will suffice to state, that a muscle in Rigor Mortis is hazy, opaque, and acid, whereas a still irritable one is transparent and alkaline. This, in general terms, Kühne confirms, but quotes, as exceptions, the sections of the still pulsating heart which are acid, whilst the rigid muscles of a rabbit starved to death were alkaline.

The experiments of Brown-Sèquard,* Stannius,† and others, would seem to indicate that the rigidity which can be induced by tying the arteries of a part, may be resolved by readmitting the blood. To this conclusion our author demurs. A thoroughly unexcitable and rigid muscle can never be converted by the blood current into an excitable one. He cut off the circulation from the thighs of frogs. . A time was at length reached, when the muscles were still fully excitable, but could make no voluntary movement, and when irritation of the sciatic, either above or below the ligature, ceased to cause any contraction. If the ligature be then removed, we obtain, as above said, a gradual restoration of the terminal nervous organs.

* Comptes Rendus, 1851. † Müller's Archiv., vol. xi.

In other animals, after applying the ligature the muscles were from time to time tested with the induction apparatus till no further reaction followed direct irritation. Then the one thigh was amputated below the ligature, whilst the circulation was restored to the other. In more than fifty trials, he never saw irritability return, when the muscles were really rigid, *i.e.*, hard, sour, and opaque, but the return of blood always induced rapid decomposition. As a test for the return of irritability, he applied the strongest induction strokes, and acids, and alkalis. Now, in the muscles of cold-blooded animals, a stage occurs when no method of excitation will induce them to contract, but still they are not rigid, but transparent and alkaline. If then a dilute acid or alkali be applied, those fibres which reacted to the induction strokes get violently contorted, and then suddenly become brown and opaque, but at last gradually clear. The first movements are the results of chemical irritation, the opacity equals the rigor of short duration, and this is followed by chemical solution. But those fasciculi which resisted the excitants, pass at once into rigor. Thus, in frogs, Rigor Mortis cannot be a contraction, as for a period prior to its supervention, the muscles are incapable of contraction, and this intermediate period is never absent. Should nutrition be again afforded to the muscle during this period, it will again react to all muscular stimuli. Hence the not yet rigid, but still not excitable muscle, may again resume its irritability. To transfer these observations to warm-blooded animals, Kühne exarticulated the hip joint of a dog, and cut through all the soft parts except the artery and the veins; these latter were ligatured. After six hours, irritability had ceased even in the deep muscles of the thigh, and they were quite rigid and acid, whilst a portion of the gastrocnemius remained alkaline, and just irritable; the ligature was then loosed; the animal survived one and a-half hours. No change occurred in the muscles of the thigh, but the gastrocnemius could soon conduct contractions along its entire length on stimulation. At death, the thigh muscles were again alkaline, and deeply imbued with blood colouring matter; next morning all the muscles were acid except those of the thigh, which were putrefying. These results Kühne considers quite in harmony with those of others. Stannius saw restitution only of such muscles as remained excitable. All these phenomena would seem to indicate the coagulation during rigor of some material which had been maintained fluid during life. Various observers, Brücke, Simon, Virchow, have asserted that they had obtained it. Kühne injected the limbs of frogs with a solution of 5 to 1 per cent. of a solution of chloride of

sodium, a fluid that may long remain in contact with the muscle without causing rigor. The blood being thus washed out, the muscles of five or six frogs are dissected out and brought under a press; a strongly opalescent alkaline fluid is obtained; in it a clear gelatinous clot gradually forms, presenting a mucous, ragged appearance under the microscope, and becoming hazy on the addition of water. The residual mass of muscle shows no evidence of rigor, and remains alkaline; next day, the fluid will be found full of white flocculi, and if it has been preserved in a warm room will be acid; at low temperatures this body coagulates slowly. At 0° C. it has been kept for weeks, but then at once coagulates in a warm room, or ultimately spontaneously. A temperature of 40° C. at once coagulates it. The fluid may from first to last remain alkaline, and in so far differs from the muscle. In order to prevent acidity, it should be carefully filtered from the mucus which is expressed with it. Acidification and coagulation may occur simultaneously, but are not necessarily connected. Water hastens coagulation. Solutions of chloride of sodium within the limits above-mentioned retard it.

An important question here arises. Is heat, a muscular excitant? Kühne used neutral olive oil and mercury warmed by a water bath as media for its application; the results observed at high temperatures were exceedingly irregular; even at from 50° to 45° C., contractions were very rare; at 37·5° C. after a considerable interval, the muscle became slightly rigid; if then exposed to the induction apparatus, the secondary coil required approaching considerably to set up contraction. Such a muscle never became more excitable after a period of rest, but went on to further rigidity; a little longer exposure to this temperature sets up that intermediate, transparent state of inexcitability, of which mention has been made. This is quickly followed by complete rigor. At 40° C., rigor is immediate; if the muscles of living frogs be dipped into oil of this temperature, they at once become rigid, their circulation continuing active. These limbs never lose the rigor, or regain their irritability; here the muscle does not decompose as after ligature; it retains its alkaline reaction, becomes imbibed with blood colouring matter, but does not endanger the life of the animal; it undergoes a kind of granular fatty degeneration and softens, but never again becomes contractile. Thus the rigor of warmth at 40° C., is a decided coagulation. We have seen 40° C, to be the instant coagulating point for the expressed muscular fluid.

Now the contractile substance contains other bodies which,

although they do not coagulate spontaneously, do so at a temperature little beyond 40° C. A rigid muscle exposed to a heat of 45° C., becomes more rigid and opaque; the shortenings of such a muscle cannot be referred to contraction; the fluids causing it may be obtained by expression from rigid muscles, and its coagulating point will he found invariably 45° C. It may also be obtained from the fluid obtained by pressure before rigidity, if the spontaneously coagulating body be previously filtered. The last traces of an albuminous body fall at a temperature of about 90° C. Are any of these bodies allied to Syntonin? Liebig's Syntonin does not coagulate spontaneously. It can also be only obtained by the use of dilute acid, which rapidly induces decided rigidity; it does not coagulate even on boiling, only if the solution be carefully neutralized, do flocculi fall, and an excess of alkali dissolves them. A muscle whence the coagulating bodies have been abstracted by pressure, will yield Syntonin to dilute acid.

Lastly, what is the state in which the coagulating bodies occur in muscle? It appears probable that contractions are under all circumstances equivalent to wave-like movements. The possibility of this is evidently coupled with a fluid condition of the contractile substance. A contraction must be so imagined, that a change of position occurs, in which the particles of the fluid quit their original sites, so to arrange themselves on the cessation of the force which induced the change of position as their weight requires them to lie. Hence a muscle after contraction never returns to its original position, without the addition of some external force, but remains in that condition of equilibrium, which is not by any outward sign to be discriminated from the state of contraction. In an irritable muscle we have a concentrated solution of albuminous bodies, in a rigid one, a firm clot. Our space will not allow us to go more fully into the many interesting topics broached in this series of papers, but it will suffice, if we have indicated the general directions at the present taken on the continent, by the question of Muscular Irritability.

Part VI.

ANALYTICAL NOTICES OF BOOKS AND PAPERS.

The reports will be purely analytical. Critical notices are inadmissable in this journal. If the authors of original papers and essays will transmit to the editor a brief summary and simple statement of the results at which they have arrived, with their printed communication, this department of the journal will be rendered more complete. Pamphlets and short papers (English and foreign) on subjects connected with medicine and surgery, which are not generally noticed in reviews, will be included in the analytical notices.

On the treatment of Intrauterine Fibrous Tumours. By T. H. Tanner, M.D., from the "London Medical Review."

There are many cases in which fibrous tumours (polypi) exist within the cavity of the uterus, and give rise to one important symptom—hemorrhage. This symptom is generally treated by the use of astringents, which agents, however, fail to be of real service. The object of Dr. Tanner's paper is to show that there is less danger to be apprehended from dilating the os uteri with sponge tents and removing the tumour, than from leaving the cases to nature.

A sketch of the Life and Works of Erasmus Darwin, M.D., F.R.S. By John Dowson, A.M., M.D.—Horne and Son, Whitby.

This little work, of sixty-one pages, consists of a lecture given by Dr. Dowson to the Literary and Philosophical Society of Whitby. Numerous notes and an appendix, on the origin of species, selected from the works of Dr. Darwin, are added. The "Zoonomia" was published about the year 1771. Numerous extracts from this work are given, as well as several passages from Dr. Darwin's last poetical work "The Temple of Nature." Dr. Dowson brings forward several quotations to show that Dr. Darwin's views have much agreement with those so recently put forward by the author of the "Origin of Species;" but he remarks that "though the two Darwins agree in their main conclusions as to the past history of the organic life of the globe, and support their opinions by very similar if not identical arguments, they differ much in their anticipations of the future."

A Manual of the Practice of Medicine. By T. H. Tanner, M.D., F.L.S., etc. Fourth edition. 1861.

This work continues to embrace all the more recent medical discoveries. In the chapter on morbid states of the blood Virchow's additions to the history of blood-crystals, together with Coote's researches on piarrhæmia, are introduced. The article on glucohæmia is brought up to the most recent standard by an analysis of the opinions of Harley and Pavy. The interesting question of the depositions of fibrin in the heart and great vessels is also examined, and an instructive case observed by the author is appended. Under the head of inflammation, the doctrines recently propounded by Dr. Hughes Bennett are carefully analysed, and are to some extent adopted by the author. A paragraph is introduced on the question of amyloid degeneration. In the chapter on diseases of the nervous system, the treatment of delirium tremens by large doses of digitalis, as advocated by Jones, of Jersey, is alluded to; and an instructive critique is introduced on the opinions recently expressed on the part performed by alcohol in the economy. Brown-Sèquard's investigations also attain their due importance in the article on paraplegia. An extended article is inserted on diptheria. The authority of Frerichs is referred to on the question of acute hepatic atrophy, etc., etc.

Epileptic and other Convulsive Affections of the nervous system. By Charles Bland Radcliffe, M.D., etc.

The author regards convulsive affections in a light very much at variance with that commonly received. An elaborate physiological introduction precedes the more strictly medical portion of the work, with the object of vindicating for living muscle a state of polarity during relaxation, such as to lead to a continuance of that state, so that contraction is to be regarded as nothing more than the necessary result of the muscle being liberated from it and left to the operation of the attractive force which is inherent in the physical constitution of the muscular molecules. After proving by quotations from Dr. West (Alford), Dugès, Matteuci, Engel, etc., that his fundamental idea has no claim to absolute novelty, the author proceeds in a series of chapters to lay the physiological evidence before his readers. He begins by referring to the experiments of Stannius on the relaxation of the rigor mortis by the injection of fresh blood, and on the converse experiment of ligature of the abdominal aorta. The experiments of Brown-Sèquard on the agency of venous blood in producing convulsions are next given; but his inferences are disputed, and the spasms are referred rather to

the absence of arterial than to the pressure of venous blood. In confirmation of this Draper's experiments on asphyxia and the effects of severe hemorrhage are quoted, as are also the experiments of Dr. Harley on the effects of strychnia and brucia in preventing oxygenation of the blood. The inference drawn is that blood is not the stimulus to muscular contraction. A considerable amount of evidence is adduced to show that muscular contraction may occur in its most exaggerated form, under circumstances in which a large amount of nervous influence would seem to be withdrawn; and the experiments of Küssmaul and Tenner are especially insisted on. In a special chapter the electrical relations of muscle and nerve are largely discussed first in reference to instantaneous and continuous currents, and then in relation to the electricity inherent to them. Under the first head Chauveau's experiments on the seventh nerve indicating the importance of the negative pole are quoted and are followed by the arguments of this observer, referring the contractions which ensue in the closure or opening of the electric stream along enfeebled nerves, to the initial and terminal extra currents which are severally set up according as the currents are direct or inverse; the initial and terminal extra currents being always in the reverse direction to the induced ones. Acting on this the author explains how contraction should attend the closure of the circuit when the current is direct, its opening when it is inverse, by shewing that the nerve has lost it power of responding to stimuli at the pole furthest removed from the muscle in either instance. In analysing the inherent electricity of muscle and nerve Dr. Radcliffe reminds his readers that the deviation of an astatic needle is greater under the influence of a relaxed than under that of a contracting muscle; and that the primary nerve-current is centripetal. After alluding cursorily to the action of strychnia, in reducing the amount of deviation of the needle, he analyses the effects of a continuous galvanic current on the incitability of nerve, and quotes many of the experiments of Eckhard on nerves exposed to a continuous inverse current; coupling these with the results obtained by Du Bois Reymond, he infers that contraction is absent when the original nerve-current is strengthened; present when it is weakened, as by a direct current. He refers the agency of the induction-coil in causing contraction to the establishment of induced currents, extra currents, and molecular disturbance, all of which weaken the original nerve-current, and he shews how their effects may be neutralized by the addition of the inverse current. The general deduction drawn from these and other facts is that contraction is due not to stimula-

tion of the vital property of muscular irritability, but to a disturbance in the electro-motive molecules. Hence nervous influence must antagonize contraction, and convulsion may be set up by arresting the supply of blood to a centre. Rigor mortis he refers to the total absence of electrical tension and to muscular anæmia. The author then applies these deductions to the explanation of the system of the heart, which he refers to temporary anæmia of the ganglia of that organ, and then considers the movement of the intestines and those of respiration. Many other points of physiological interest are also discussed. Passing to the pathological portion of his work, the author argues that the interparoxysmal state, the pallor preceding the fit, and the post mortem appearances, are indicative of dimished rather than of increased action, and that the different states of morbid irritability to which the fits have been ascribed, *e.g.*, teething should be considered as equivalent to inefficient innervation. He is consequently in favour of a sustaining plan, both generally and medicinally, and speaks well of steel, cod-liver oil, naphtha, the ethers, etc. He is not very zealous for any specific. The other convulsive affections are also reviewed in accordance with the above, and an elaborate attempt is made to fathom the pathology of chorea. Finally incidental spasms are referred to.

Sore Throat and the Laryngoscope. By Dr. Prosser James. The plan of the book is simple. In the first part Dr. Prosser James gives a general brief sketch of his subject; in the second the more important diseases of the throat are separately considered in detail; in the third a selection of cases, illustrative of the novel points mentioned, are formed into an appendix. It was of course impossible, in some points, to state anything new; a sketch, therefore, of other subjects on authority completes the outline. The diseases are severally succinctly described, and the various discussions to which they have given rise are briefly alluded to. The author warmly advocates the value of tincture of aconite in this class of affections. He says, "although I have used it in thousands of cases I have never produced alarming symptoms of poisoning, and I know of no medicine which less frequently disappoints my expectations." His usual dose is two minims of the pharmacopeial preparation. Corroborative cases are given. The relation of ovarian irritation to tonsillar affections is also insisted on and illustrated by cases. Dr. Prosser James claims to have contrived and used the laryngoscope before it was introduced by Czermak into this country. Case 12 (appendix) shows how he illuminated the

pharynx, and by a mirror discovered and applied nitrate of silver to ulcers of three years standing as early as 1856, and after several had failed to make out a diagnosis. In the face of a dispute in Germany as to priority, Dr. Prosser James claims credit for completing Liston's idea without German aid. Although not expecting at that time to see the vocal cords, the plan of the laryngoscope was complete, and a perfect pharyngoscope was proved useful.

The relations existing between Urea and Uric Acid. By William Hammond, M.D., Assistant Surgeon, United States Army. 1855.

The results of some experiments are here given, made with the object of ascertaining whether the theory of Liebig in regard to the formation of urea from uric acid could be sustained by further investigation. The first series of experiments the author performed upon himself, regulating his diet and analysing his urine, whilst he severally took much, little, and no exercise. The second series was performed upon a black snake (Coluber constrictor), the excretions of the animal being measured whilst it was confined in a jar, at first supplied with atmospheric air and afterwards with oxygen. Both series of observations tend to confirm Liebig's view.

The physiological effects of Alcohol and Tobacco upon the Human System. By William Hammond, M.D., etc. 1856.

The effects of alcohol were observed when the weight of the body was maintained at a nearly uniform standard by a sufficiency of food, when the body lost weight from a deficiency of food, and when it gained weight from an excess of the same. The weight of the body, the quantity of carbonic acid and aqueous vapour, expired in respiration; the weight of the feces, the quantity of the urine, and the amount of its free acid, urea, uric acid, chlorine, phosphoric and sulphuric acids, were severally determined. The author arrives at the conclusion that alcohol increases the weight of the body by retarding the metamorphosis of the old tissues, promoting the formation of new, and limiting the consumption of the fat. The carbonic acid and aqueous vapour of respiration were diminished, the feces and urine were reduced in amount, and all the salts of the latter were lessened in quantity. His experiments with tobacco lead the author to infer that it has no material effect on the excretion of carbonic acid from the lungs, but that it lessens the amount of aqueous vapour given off in respiration. That it diminishes the amount of the feces, and lessens the

quantity of urine, together with the amount of its urea and chlorine. Lastly that it increases the amount of free acid, uric acid, phosphoric and sulphuric acids, eliminated through the kidneys.

Experimental researches relative to the nutritive value and physiological effects of Albumen, Starch, and Gum. Prize Essay of the American Medical Association for 1857. By W. A. Hammond, M.D., etc.

A series of experiments, of which the author was the subject, are here detailed with great accuracy. In every instance the urine and feces were carefully analysed, and the loss through the skin and lungs obtained by difference. A preliminary series of experiments extending over five days, during which an ordinary diet was observed, is intended to serve as a standard. A stated quantity of albumen and water was then daily consumed during ten days, the excretions being measured as before. The results obtained were a diminution of the absolute amounts of the water and solids of the urine, a very slight increase of urea, a considerable elimination of uric acid, a reduction in the chlorine, sulphuric, and phosphoric acids. The whole quantity of feces was increased, but this was chiefly to be referred to a diarrhœa which supervened on the two last days. The weight of the body declined materially, the pulse was increased in frequency, the temperature reduced. The water, blood corpuscles, inorganic salts, and fat of the blood fell in amount; whilst the fibrin, albumen, and extractives were increased, the latter remarkably so. The author next considers the capability of the digestive organs to dissolve, and the absorbents to assimilate, a sufficient quantity of albumen to support the calorifacient process, and the relation which the nitrogen of the urea and uric acid excreted bears to the amount absorbed in the albumen. He concludes, first, that the digestive organs can dissolve enough albumen to supply the system with the necessary amount of carbon and nitrogen; second, that the proportion of nitrogen eliminated by the kidneys is much less than is generally supposed; and third, that even when the body is losing weight from the oxidation of its fat, the excess of nitrogen over that escaping by the kidneys is retained in the system (over two-thirds), or that some other means of elimination exist. During the last four days, during which the experiments were protracted, albumen was detected in the urine. A similar series of experiments was next instituted with starch. On and after the fifth day the urine became saccharine, and was abundantly so towards the close of the

experiments. All the normal solids of the urine became greatly reduced; the whole body lost weight but slightly, and certainly not enough to account for the drain from the waste of the nitrogenous tissues, showing that very considerable amount of new matter must have been deposited within the system. The actual increase in the temperature of the body, and several of the pathological occurrences also show that there was no deficiency of carbon in the system. The fibrin, extractives and fat of the blood, were increased; the blood corpuscles, albumen and salts were diminished. On the whole this investigation furnishes further evidence of the incapability of starch to sustain for any length of time health or life in the human subject. A last series of experiments related to gum; but the hunger, debility, and febrile excitement induced were so great on the fourth day that the trial could not be persisted in. At last gum failed to relieve even for a short time the sensation of hunger. The solids of the urine were much reduced although the whole quantity passed was augmented. The entire amount, as also the water extract of the feces, were increased; the ether and alcohol extracts were diminished. The total loss of weight of the body was very great, and the constitutional disturbance more severe than from the exclusive use of either albumen or starch.

On the alterations induced by Intermittent Fever in the physical and chemical qualities of the Urine, and on the action of the Disulphate of Quinine. By W. A. Hammond, M.D. 1858.

A series of experiments on his own person again furnished the author with his data. During the attack he found the uric and phosphoric acids much increased in amount, and the urea and chlorine greatly diminished. During the intermission there is a close approach to the normal proportions, but a subsequent paroxysm restores the former condition. The disulphate of quinine, however, produces a permanent impression on the character of the urine.

The injection of Urea and other substances into the blood. By W. A. Hammond, M.D., etc. 1858.

The object of the experiments here detailed was to ascertain the correctness of the theory avdanced by Frerichs explanatory of the uræmic intoxication. Two series of experiments were instituted; in the first, the substances used were injected into the blood of the sound animal; in the second, the kidneys were previously extirpated. The substances injected in both series were urea, urea and vesical mucus, carbonate of ammonia, nitrate of

potash, sulphate of soda. The results obtained were that none of these substances, except nitrate of potash, proved speedily fatal; that death ensues from any of them, the kidneys being previously extirpated; that in neither case does urea, when introduced directly into the circulation, undergo conversion into carbonate of ammonia.

On the action of certain Vegetable Diuretics. By W. A. Hammond, M.D.

Digitalis, juniper, squill, and colchicum were employed, and the results arrived at tend to show that neither of the three former increases the total amount of solid matter eliminated by the kidneys, but that the organic matter is considerably reduced through their influence. Colchicum, on the other hand, increases the excretion both of the organic and inorganic solids.

Experimental Researches relative to Corroval and Vao, two new varieties of Woorara. By W. A. Hammond, M.D., etc., and S. Weir Mitchell, M.D., etc. 1859.

The history, chemistry, and physiological properties of Woorara, as given by authors, are first analysed. The chemical and physiological properties of Corroval are then descanted on and largely illustrated by experiment, the investigations leading to the following conclusions:—That it acts primarily upon the heart, thus differing essentially from Woorara. That the annihilation of voluntary and reflex movements is a secondary result of this action. That both the sensory and motor nerves are acted upon from periphery to centre. That muscular irritability is destroyed, and the sympathetic nerve primarily paralysed. That it can be absorbed both from the intestines and skins of frogs, and that its properties depend upon an alkaloid which the authors propose to call corrovalia. The conclusions arrived at with Vao, may be thus summed up. The stomach and intestines of warm-blooded animals will absorb it whilst fasting. At first, the force of the heart is increased, the number of pulsations remaining the same; then paralysis ensues, the ventricles being first affected, and the heart stopping before voluntary motion is at an end. The respiration of warm-blooded animals is arrested by arresting the circulation, and so paralysing the nervous system. Artificial respiration will not sustain the cardiac movements. The sensitive nerves are affected earlier than the motor, the paralysis going from periphery to centre. Muscular irritability is lost early. The sympathetic nerve is paralysed, at least in the upper portion of its

distribution, before the nerves elsewhere have lost their functional power. The blood coagulated as usual, and changed colour when exposed to oxygen or carbonic acid. No physiological antidote is known. Its alkaloid produces effects perfectly similar to those of corrovalia. The authors conclude, therefore, that Vao is merely a weaker variety of Corroval, and that the apparent differences in the effects produced is due to a difference in the strength of the original extracts.

On Uræmic Intoxication. By W. A. Hammond, M.D., Professor of Anatomy and Physiology in the University of Maryland, etc.

A series of experiments instituted with the object of testing the hypothesis of Frerichs. They lead to the conclusion that the injection of urea in limited quantity into the blood of animals produces a certain amount of disturbance, similar to that of the earlier stages of uræmia, but soon passing off if the kidneys are active; the injection of a large quantity of urea, however, causes death by uræmia. Ligature of the renal arteries, or removal of the kidneys caused similar results, but only when the urea or the products of its metamorphosis ceased to be discharged by the stomach or intestines. The urine, as a whole, is more poisonous than simple solution of urea, but either of them induces such a state of nervous system as strongly to predispose to inflammation of the viscera. Urea would, further, seem to check the process of sanguification, either hastening the decomposition of the red corpuscles, or interfering with the removal of such as are broken down and effete. The author considers the evidence conclusive against the conversion of urea into carbonate of ammonia, more urea being generally found in the blood taken from the body after death than in that abstracted during life.

On the State of Lunacy, and the Legal Provision for the Insane, etc. By John T. Arlidge, M.B., A.B., etc.

The author shows how imperfect are the official data referring to the number of the insane, by adverting to private lunatics and the numbers confined in prisons, workhouses, etc., thus accounting for the discrepancies in the returns made by the Commissioners and by the Poor Law Board respectively. He calculates the rates of increase of the several varieties of lunatics, and offers suggestions for obtaining improved statistics of pauper lunatics. After a short *exposé* of the curability of insanity, he divides the causes diminishing this into those external to asylums and those operating within them. Under the former head, the

detention of patients in their own houses, in workhouses, and with strangers are severally discussed, and an article is introduced on the detrimental effects of improper management prior to the admission of cases into the asylums. Under the latter, magisterial interferences, the excessive size of asylums, and the inadequacy of medical attendance are pointed out. In considering the future provision for the insane, the author urges the value of separate asylums for the more recent and for chronic cases, and advocates the system of borough asylums. He also dilates upon the advantages of separate sections, and believes the cottage system, under proper supervision, to be worthy of a trial. Considering the present staff of Lunacy Commissioners, to be inadequate, he proposes the appointment of Assistant Commissioners. In some concluding remarks on the construction of public asylums, he points out the advantage of a complete separation of the day and night accommodation.

On the Molecular Theory of Organisation. By Professor Bennett, M.D., F.R.S.E., etc., 1861.

As a protest against the new doctrine of "Omnis cellula e cellulâ," the author insists upon the great importance of the molecular element. He describes the nature and mode of origin of organic molecules, both histogenetic and histolytic. He then argues for the independent nature of the force governing these, and shows that this has no relation to cell, nucleus, or any other form of structure. He further defines what, in the present state of science, must be understood by the expressions life and vital action. Finally, Professor Bennett argues that the development and growth of organic tissues is primarily owing to the successive formation of histogenetic and histolytic molecules.

On the Estimation of Sugar in Diabetic Urine by the Loss of Density after Fermentation. By W. Roberts, M.D., etc.

The object of this paper is to supply the practitioner with a ready and simple method of calculating the amount of sugar in diabetic urine. The principle involved is, that saccharine urine, when fermented with yeast, falls considerably in specific gravity. As this must be proportioned to the quantity of sugar broken up by the ferment, the amount of this diminution supplies a means of calculating how much sugar any urine contains. Owing to its simplicity, the author believes that, in active practice, this method will be found more useful than the volumetric one now in favour.

On "Supporting the Perinæum." By Graily Hewitt, M.D., London, etc., 1861.

The presumed advantages of this practice in midwifery are contested. The effects of such support on the head of the child and on the perinæum itself are discussed at large. The author especially argues against the fallacy of directing the head forwards, which he stigmatises as actually mischievous, in ordinary cases, by interfering with its passage beneath the pubic arch. He also considers that, by pushing the soft parts forwards, the substance of the perinæum is expended in a useless manner, and that the argument that the soft parts are relaxed by pressing them forwards, has no foundation. The effects of supporting the perinæum in impeding the normal process of dilatation are then reviewed. The causes of laceration are referred to the uterus, the presenting part, the pelvis, and the perinæum itself. The author believes most of the so-called cases of rigidity to be really cases of impeded labour, due to deficient uterine power, some abnormality of the presenting part or of the pelvis. True rigidity, he considers extremely rare. As a whole, the operation of supporting the perinæum is rejected. The French practice of delivering the woman lying on her back is recommended, and care should be taken to direct the shoulders well forwards. Should laceration be actually impending, a slight incision by each side of the fourchette is advocated. In those cases where the so-called rigidity is due to some other cause, a careful use of the forceps is best.

Clinical Lecture on the Treatment of Acute Rheumatism, Pericarditis, and Pneumonia by the Eliminative Method. By B. W. Richardson, F.R.C.S.I., etc., 1861.

The practice of the late Dr. Todd in the treatment of this disorder is discussed, and a case of its application given in full. The author discusses the nature of the deposits in the valves and the physiological effects of the treatment employed.

Recherches Anatomiques sur le Corps Innominé. Par J. A. Giraldès, Prof. Agrégé de la Faculté de Medecine de Paris, etc., 1861.

The author describes, on the spermatic cord, a tubular organ formed by the rudiments of the Wolffian body, which continues to be developed till adult age. This he considers the origin of those tumours of the cords known as cysts, or as encysted hydroceles. The pamphlet is illustrated by a number of excellent engravings.

On the Sounds caused by the Circulation of the Blood. By Arthur Leared, B.A., M.D., Dublin.

The author considers that the heart's sounds are not in any way caused by the tension of the valves. His experiments have proved to him that "all sounds formed in connection with the circulation are produced by and in the blood itself, and their mechanism is virtually the same." Four conditions are necessary for the production of the perfect first sound:—1. Sufficient viscidity of the blood. 2. Sufficient force in the circulation. 3. Sufficient pressure upon the blood. 4. The absence of obstruction at the outlets of the heart. If a jet of fluid be projected into a reservoir of fluid, a sound is produced, and this sound is modified if the viscidity of the fluid be altered. Its intensity will vary according to the force used in its projection. The author concludes his thesis as follows:—"In short, vibration of valves or other structures, when in contact with blood, has no more to do with the sounds than the vibration of a door with the sound produced by the passage of wind through its keyhole. The sounds are, in the one case, due to rapid motions in the air itself, and, in the other to rapid motions in the blood itself."

Statistical Report of Patients treated in St. Thomas's Hospital from the Year 1857 *to* 1860. By the Registrars of the Hospital, William Ord and W. H. Stone, 1858; J. Allingham, Henry Gervis, 1860. Edited by W. H. Stone, M.B., Assistant-Physician to St. Thomas's Hospital.

This Report consists of two parts. The first part contains the following Tables:—I. A general statement of the number of patients admitted in the hospital; the number discharged well, relieved, unrelieved, and discharged for special reasons, with the average number resident daily throughout the year, mean residence in days, and the rate of mortality, which amounts to 7·96 per cent. II. Showing the results in the various cases of disease in each year separately. III. and IV. of ages and illnesses previous to admission. V. Causes of death in surgical diseases, after accidents and operations.

The second part contains the details of groups of cases exhibiting special interest, arranged in a tabular form. There is an analysis, with the symptoms and the results of treatment of 44 cases of chorea, 29 of delirium tremens, 28 of delirium tremens and alcoholismus, 26 of neuralgia, 34 of paraplegia, 3 of empyema, 47 of plumbism, 14 of hematemesis, 12 of hepatic disease, 32 of icterus, 4 of peritonitis, 11 of strangulated hernia, 23 of anasarca post scarlatinam. Next follow four tables of

venereal diseases and one of erysipelas, containing 29 cases. Fever cases are grouped in three tables:—I. Showing 11 cases of typhus treated during 1858. Of these 2 were fatal, and 6 cases during 1859, of which 1 was fatal. II. 25 cases of typhoid during 1858, of which 5 were fatal. 32 cases of typhoid during 1859, of which only 4 were fatal. III. 9 cases of remittent and relapsing fever, of which 1 was fatal. Total, 83 cases of fever, 13 of which were fatal, or under 16 per cent.

Tables follow which give the results of injuries and lists of operations and fractures, with cases of lithotomy and excisions of joints are also given. The Report concludes with "Further Details concerning Operations" during the year 1858.

A Report of this kind should be furnished annually by every hospital and every public medical charity in the kingdom.

A Practical Treatise on the Ophthalmoscope, being the Essay for which the Jacksonian Prize, in the year 1859, *was awarded by the Royal College of Surgeons of England.* By J. W. Hulke, F.R.C.S., Assistant-Surgeon to King's College Hospital, &c.—1861. pp. 70.

To render the prize essay of more general utility, the author prefaces his book with a succinct account of the theory of the ophthalmoscope, and with a description of the various instruments at present in use. He then proceeds to give a brief outline of the appearances presented by the healthy ocular structures, and he analyses the theories advanced to account for the phenomena observed in the retinal circulation. After alluding to the morbid appearances presented by the cornea, lens, and vitreous humour, Mr. Hulke describes the deep changes accompanying coloboma in its different varieties, and refers to the occasional abnormal position of the optic disc, as observed by Desmarres and V. Græfe. The gradual and abrupt excavation of the optic disc, and their relative pathological importance, are next discussed, and allusion is made to the causes of unnatural elevation of that part. Anæmia of the optic disc next claims attention. The author believes that he has met with a case of embolus of the retinal artery. In contrast with these, true atrophy of the disc is quoted. The morbid anatomy and diagnosis of retinitis are next passed in review, and then the author quotes the appearances presented by a number of cases of retinal hemorrhage that have come under his notice. Detached retina, and the errors incident to its diagnosis, are illustrated. The author concludes this chapter with an analysis of the intra-ocular changes in kidney disease, as described by various German writers, of whom he appends a

list. Diseases of the choroid are similarly discussed with those of the retina, the pathology and appearances of inflammation of that tunic and of posterior staphyloma being pretty fully surveyed, and the description of the latter illustrated with cases and dissections. A summary is then given of the phenomena of glaucoma. The author ends his work with descriptions of intra-ocular cancer, tubercle, and entozoa. The book is illustrated with a series of beautiful chromo-lithographs and with many of finely finished engravings.

Observations on Progressive Muscular Atrophy. By E. Symes Thompson, M.D., Assistant-Physician to King's College Hospital, &c.—1861. pp. 17.

This paper is a reprint from the Transactions of the Medical Society of London. The author quotes the particulars of four cases that have come under his observation, and quotes others from the practice of Dr. Wetzlar. In discussing the origin of the disease, the author disposes of, by exclusion, the spinal cord, the anterior nerve roots, and the arteries, and concludes that the affection is primarily a muscular one. He then reviews the difficulties attendant on its diagnosis, alluding particularly to metallic poisoning and partial infantile paralysis, and ends by advocating the use of Faradization and a general tonic treatment.

General and Descriptive Anatomy of the Domestic Animals. By John Gamgee, Principal, and James Law, Professor, in the new Veterinary College, Edinburgh.—1861.

This work begins with a succinct history of the structure and functions of the animal tissues deduced from the most recent sources, British and foreign. It then gives a detailed account of the osseous system, as found in the cow, horse, dog, &c. The book is intended for the use of students, and is abundantly illustrated with woodcuts.

Archiv für die Holländischen Beiträge zur Natur in Heilkunde. Band III., Heft I.—1861.

The present number of this journal contains, among much other interesting matter, two papers, by I van Deen, on the formation of sugar from glycerine in the animal economy. The author details the arguments which justify the recognition of glycerine as an alcohol, referring to the discovery of the acid of the series by Pasteur, and to the observation of Berthelot, that its aldehyde could be produced by fermentation with albuminous matters. His own researches corroborate the conclusion of

Lehmann that this last is identical with Bernard's glycogen. He argues that glycerine is converted into sugar in the economy. In the first part of his treatise, he shows how sugar may be formed out of glycerine externally to the body, the agents employed being the constant stream and nitric acid, the results with the latter being very striking. In a second part he traces the transition of glycerine into glycogen, sugar, &c., in the economy, and especially in the liver. He fed dogs, that had been previously starved for several days, on glycerine and water, and found an abundance of glycogen in the liver, the analyses of other portions of the abdominal viscera tending to show that it must have been formed *in situ*. Thirdly, he shows how free glycerine may reach the liver. He assumes, from the different phases of fat deposition and resorption, that glycerine must always be present in the blood, and shows how it may originate independently of the fats present in the system. The presence of fat in the liver does not suffice to cause the formation of glycogen, because the fat must be split into glycerine and fatty acid. The condition for this is supplied by the formation of bile, which latter requires the presence of albuminous bodies, as the derivatives, glycine and taurine, appear simultaneously. Hence he concludes that there is a relation between glycerine, glycogen, sugar, and fatty acids, and between these and bile. The present number further contains a paper vindicating the individuality of roseola epidemica, and describing its course. It also contains a contribution by Brondegeest, illustrating the use of the sphygmograph in cardiac disease, and a paper by Buys Ballot, on the direction and force of winds.

Die Entwicklung der Adergefleckte. Von D. Jul. Kollmann. —1861. pp. 40.

Whilst attending more particularly to the development of the choroid plexuses, the author also gives a sketch of that of the brain during the earlier months of fœtal existence. After giving a slight description of the disposition of the cerebral circulation in the mature fœtus, the author describes the cerebral development between the sixth and eighth weeks, insisting that the cerebral hemispheres are not, as Luscka has said, lamellæ that are developed backwards and inwards, but capsules with only one minute aperture at their posterior part. The choroid plexuses of the lateral ventricles are already developed, whilst a curtain of pia mater, which hangs vertically downwards and is reflected over the optic thalami, communicates with them through the apertures above referred to. The falx next splits this curtain of pia mater into two layers. In the fourth month

only are the velum interpositum and the plexuses of the third and fourth ventricles developed, whilst the venæ magnæ Galeni are not formed earlier than the fifth month of intra-uterine life. Thus the choroid plexuses of the lateral ventricles are the earliest formed of the cerebral plexuses. The pamphlet is illustrated with five photographic engravings.

Over de Werking der Musculi Intercostales. Door Antonie Hendrik Schoemaker.—1859. pp. 76.

This pamphlet is a prize essay read at the University of Utrecht. The author divides his essay into two parts In the first he gives a historical and critical review of the theories advanced by physiologists touching the action of the intercostal muscles, from Galen down to the present day. He divides this review into two portions, that preceding 1842, in which he especially refers to Senac, Haller, and Hamberger, and that subsequent to 1842, including Majendie, Donders, Henle, Budge, &c. In the second part, after a brief description of the anatomy of the thoracic walls, the author experimentally determines the position of the axis around which the rib revolves in its joint to the vertebræ, first when detached, and then when connected with the sternum. This he found to go through the neck of the rib from behind, externally and superiorly, in the direction forward, inwards and downwards. The point of entrance lies immediately behind the costo-transverse articulation. The inclination of the axis of the eighth rib is almost parallel with the horizon; thence upwards to the first and downwards it becomes more and more vertical. This axis is nearly constant, whether the rib be connected with the sternum or not. The author then analyses the movements of the thoracic and abdominal respiration respectively. Passing finally to the action of the intercostal muscles, he concludes that the external ones raise the ribs in thoracic inspiration, and that under certain conditions the internal may assist their action. The intercartilaginous muscles are inspiratory. The internal intercostals drag the ribs downwards, and narrow the intercostal spaces. They are thoracic expiratory muscles, but assist in abdominal inspiration.

Het Lichtbrekend Stelsel van het Menschelijk Oog, in gezonden in Ziekelijkin Toestand. Door F. C. Donders. pp. 43.

In the present paper Professor Donders describes the different methods employed at various times to estimate the curvature of the cornea, and then gives the results of his own measurements both on healthy and on diseased eyes. He employed the ophthalmometer of Helmholtz, but, instead of calculating

back from the angle of deviation of the glass-plate required to give the two corneal images a certain position, he determines empirically what number of degrees pertains to certain magnitudes. With this object, he places a silvered plate three millimetres high, and pierced transversely with lines one-tenth of a millimetre asunder, immediately in front of the two revolving plates of the ophthalmometer. When the plates are parallel, none of the lines overlap, but when at an angle to each other, inasmuch as the corneal image becomes double, a certain number of the lines become intensified, and thence the angle can be calculated back. This method he applied to the healthy cornea, and also to emmetropia, myopia, and hypermetropia. His results are embodied in a series of tables.

Onderzoekingen betrekkelijk de kimstmatige Verwijding van den Oogappel. A. W. Kuyper.—1859. pp. 62.

The author starts by discussing the influence of the different nerves on the movements of the iris. He remarks that the indalation of chloroform increases the dilatation of the pupil induced by the sulphate of atropine. When the dilating power of atropine is at its maximum, irritation of the sympathetic further dilates the pupil. Diminution in the blood-pressure of the arteries of the iris has no influence on the pupil. Digitaline increased the diameter of the vessels of the iris. When the sympathetic was then irritated, these vessels ceased to be visible. Passing to the mode of action of mydriatics in general, he argues in favour of their absorption into the aqueous humour, and discusses their effect on accommodation, on the pressure of the humours of the eye, and on the muscle of Brücke. He then tests the value of all the reputed mydriatics, and concludes that the alcoholic extract of stramonium is as powerful as that of belladonna, and that hyoscyamus stands next to them. He concludes by laying down some general principles on the preparation and selection of this class of remedies.

ARCHIVES

OF

MEDICINE.

Part I.

CLINICAL OBSERVATIONS.

ON OPHTHALMIA.

By Jeffery A. Marston, M.D., Assistant-Surgeon Royal Artillery.

Plates XII and XIII.

THE subject of ophthalmia, as it prevails in the army, is brought before the profession because it is conceived that erroneous impressions are very generally entertained with reference to one, at least, of its most common forms.

While some would seem to include all conjunctival disease under the one head—conjunctivitis—and would explain the different appearances and morbid states, by a reference to the different degrees of inflammatory phenomena existing in different cases, tracing the phases of the disease from the simpler elements of the most trifling vascular reaction upwards, to the more intense purulent inflammation of the membrane; there are others who perceive in the ophthalmia of armies an altogether specific affection. These latter regard the conjunctivitis ordinarily attacking the soldier as a disease *sui generis,* having a special etiology, running through a different course, and marked by such symptoms and pathology as entitle it to be ranked separate and distinct from the conjunctival diseases ordinarily prevailing in civil life.

Military ophthalmia, uncommon in England, but only too prevalent abroad, is hardly ever seen at the various ophthalmic institutions, at a period corresponding with its primary or early stages. The cases, such as present themselves at ophthalmic hospitals, are suffering from advanced forms of the malady, when any analytical examination into the nature of the changes and progress of the disease in the elemental structure would be futile, both on account of the extensive

alterations in the palpebral conjunctiva, as well as the various other morbid lesions which have arisen.*

To the report of the "Congrès d'Ophthalmologie de Bruxelles, 1858," I am indebted more particularly for my first acquaintance with the true import of the phenomena, which I had long observed in the disease in question. It will be necessary to premise a succinct account of the histological anatomy of the palpebræ to render the succeeding remarks intelligible. Besides the loose layers of skin extending over the eyelids; the pale muscular fibres of the orbicularis; the tarsal cartilages, with their Meibomian glands; and their fibrous suspensory ligament, obtained from and continuous with the periosteum of the orbit; we have the lining membrane, or conjunctiva. This belongs to the class of membranes having a laminated pavement epithelium. The free surface is covered with a layer of epithelium of flattened polygonal scaly appearance. The cells are very clear, large, $\frac{1}{500}$, $\frac{1}{1500}$, to $\frac{1}{2000}$ inch in diameter, with distinct oval nuclei, and refracting nucleoli; the long diameter of the cells of this free surface is, for the most part, parallel with the long diameter of the lid. Their edges appearing to be not only apposed, but even overlapping one another, forming a laminated pavement. As we pass deeper, the cells, still polygonal, are smaller, and tend to the spheroidal form, to which configuration they conform in the deeper layers. The cells in immediate contact with the papillary structure, have, more or less, a vertical arrangement, are much smaller, and of the character of enlarged nuclei. They lie embedded together, and capping the sides and apices of the papillary structures, the wavy, undulating ridges of which they follow and serve to map out. These cells are supported by a layer of submucous areolar tissue, analogous to that of the tunica nervea of mucous membrane, or the dermis of the skin. This investment, in which the vessels and nerves ramify, is composed of an indistinctly fibrillated substance, commingled with yellow fibre, in sparing proportion, and disposed in coarse areolæ. The superficial portion of this layer differs from the deeper only in the closer arrangement of the connective tissue, the smaller size of the areolæ, and the prolongation of such fibrillated tissue into conical, rounded, or oval elevations,—the papillæ.

The tissue in which this species of ophthalmia runs its pathological course is a connective tissue.

* Mr. Dixon, in his Contribution to Holmes' System of Surgery, upon Ophthalmic disease, does not allude to the premonitory and pre-existing vesicular state of the lids, as the most fruitful source of granular lids.

By a connective tissue I understand "a number of cells retaining their nuclei, round each, or each group of which, a quantity of tissue material (indifferent tissue) is collected, the quality of which, as a tissue, depends upon the consistence and constitution of this intercellular material;" the whole corresponding with the endo- and peri-plasm of Huxley; the masses of *germinal matter* and surrounding *formed material*, of Beale; or the cell and cell-territories of Virchow. The latter physiologist and pathologist teaches, that "the nutrition of these tissues, whose function is a mechanical one, depends upon the selecting and organizing properties of the cells; their growth by a due increase in number, their repair by more abundant reproduction." The papillæ resemble the similar structures of the cutis. Upon the tarsal portion of the membrane the papillæ generally, have a simple conformation, are small, and more or less cylindrical or conical. At the retro-tarsal reflection however, the conjunctival membrane not only becomes much thicker, from containing a larger amount of connective tissue, but is at the same time looser in its texture and connexion with surrounding parts, to allow of the different movements entailed upon this part of the lid. Here the papillæ are much more compound in structure. They are larger (as much as $\frac{1}{10}'''$ long) and assume a warty or fungiform character (from the production of secondary papillæ, closely placed and conical,) resembling indeed the fungiform papillæ of the tongue.

The papillary layer is developed from the fibrillated connective tissue of the corium, and is prolonged into more or less conical or columnar projections. The connective tissue can only be traced into the bases of the papillæ, whose conical apices appear almost entirely composed of a homogeneous-looking substance and small spheroidal epithelial cells. These papillæ have an arrangement in rows, parallel to the long axis of the lid. I have been unable by any reagent to develope a basement membrane, supporting the epithelium. The whole of the submucous tissue is a highly vascular nervous structure. The course of the nerves is easily determined in sections treated by soda.

In the retro-tarsal region of both lids there exist a few compound acinose glands, viz., those so well described by the two Kraüses. They are best seen in that portion of the connective tissue layer immediately subjacent to the epithelium and papillæ, where the areolated tissue is laxer and less closely attached to the subjacent textures. By pinning this part of the membrane to a cork, and permitting it to dry, or by previously hardening it in chromic acid, vertical and horizontal

sections can be easily made, by which the minute structure of the glands can be accurately determined. The application of glycerine and acetic acid facilitates their examination. It is curious that in some eyes these structures are found with great difficulty, while in others it is a comparatively facile proceeding. If a section has been cut from a part previously hardened in alcohol, great care must be taken in teazing out the preparation, so as not to put it too much upon the stretch, for this, (and the subsequent addition of water,) renders the tissue very opaque. In diseased lids these glands are very easily discovered, with the aid of a lens, on account of their greater size and development, indicating their exact site. They are particularly liable to hypertrophy in granular disease of the lids; indeed I shall have reasons to adduce to prove that in certain forms of "vesicular" lids, these organs become affected.

They conform to the racemose or conglobate type, are but few in number, sparsely shed in the connective tissue layer, and open by small ducts upon the free surface of the lids. These little mucous glandular bodies range from $\frac{1}{5}$ to $\frac{1}{2}\frac{1}{5}'''$ in size.

The small flask-shaped open follicles discovered in the ocular conjunctiva by Manz, and subsequently by Stromeyer, in the conjunctiva of the human eye, near the cornea, do not exist, as far as my observation goes, in the palpebral portion of the membrane. It is interesting that these little bodies exist at the exact site at which the so-called phlyctenulæ of strumous conjunctivitis make their appearance.

In addition to these little compound acinose glands of Kraüse, others have been described;—a system of small saccular closed follicles or mucous crypts, both by Van Roosbröeck and Bendz. As these observers consider them to be the special seat of important pathological changes by which vesicles are produced, we must advert to them.

Van Roosbröeck published his researches into the causes and pathology of purulent ophthalmia, many years ago, in which he pointed out the important changes ensuing in certain glandular and closed mucous follicles, the existence of which in very great numbers, he declared was part of the normal structure of the palpebral portion of the conjunctiva. Bendz, whose observations are of the most valuable and important character, states "that the little glandular bodies are closed sacs (filled with cells, nuclear particles and fluid,) hardly appreciable to the eye, but apparent to the microscope: round or ovoid, of a whitish colour, surrounded by an amorphous opaline membrane, and seated in the vascular corium." He describes, indeed, two kinds of these glands—the simple and agminate,

analogous to the intestinal glands. He speaks of the agminate variety being pretty constantly present, as a patch near to the external canthus. He decided, too, that these follicular organs were limited to the palpebral conjunctiva. The small vesicular looking bodies represented in the accompanying Plate, and which, as we shall see, play so important a part in soldier's ophthalmia, Bendz conceives to be neither more nor less than these bodies affected with a specific morbid process and deposit. Recognising thoroughly the specific characters of military ophthalmia, he proposes to call the little granular bodies *glandular*, to distinguish them from the ordinary *papillary* granulations.

If we minutely inspect the lining membrane of the eyelids of the men of a regiment, we shall observe, (certainly in the colonies,) that some of them present small raised bodies, like Sudamina or Herpes. In one man there will be but two or three such, and these very transparent, and limited to the outer canthus; in another, the conjunctiva will appear as it were the seat of a vesicular disease, such as "Herpes," so studded will be the membrane with these bodies.

Müller and Eble directed the attention of the profession to this vesicular-looking disease years ago.

From repeated examinations I am not convinced that the follicular organs described by Bendz have a constant physiological existence.*

By removing one of the vesicular-looking bodies, teazing it out, and using a low power (one inch,) we observe a round or oval-shaped granular mass, dark-looking and opaque in the centre, passing off into a lighter shade towards the periphery, where the colour almost abruptly fades into that of the neighbouring part of the fibrillated-looking stroma, upon which the

* As early as 1859 I thought that I had discovered small follicular bodies in the normal conjunctiva. Failing often afterwards to detect them in healthy lids; observing how morbid products mimicked their characters, and their disproportionately large number in diseased lids, I have thought it best to adopt the conclusions in the text. My friend Dr. Frank was kind enough to inquire of Professor Kölliker, when he visited Fort Pitt, whether he had detected these physiological organs in the conjunctiva, but that distinguished histologist denied their existence, in common with other observers. Kraüse, junior, quite recently, has come to an affirmative conclusion as to their presence. He prepares his specimens by steeping the lids in vinegar for three days, by which the epithelium is removed. The very minute whitish prominences which then appear, he removes by scissors,—treats with glycerine,—and examines. The subsequent addition of liq. potassæ brings out the reticula. Henlè, in a recent paper upon conglobate glands, has also described organs, under the name of trachomatous glands, as normal structures in the eyelids of animals. An illustration, at the end of this paper, represents a happy section, prepared in the above manner. Plate xiii, fig. 5.

vesicle appears, as a little ganglion or knot. By placing the object under a quarter inch, we can trace exactly the limits and character of the new products. This little knot will be found to correspond to one of the interstices, or minute areolæ, naturally existing between the connective tissue elements. In this vacuole or mesh, we have an outgrowth of new cells,—the cells, nuclei, and granules of all sizes, being massed together in luxuriant growth. The number and mutual aggregation of these neoplasms give, in a coarse section, an opaque appearance, from transmitting the light imperfectly. Around this, and further from the focus of the disease, we observe the white wavy tissue, granular-looking, broad, ill-defined, and with indistinct edges towards the centre of the growth. Now this little nest of cell-growth so defined, exactly assimilates to a follicle, filled with granular and cell contents, and is really nearly identical in appearance and constitution with the vesicular-looking condition which the mucous follicles of the colon assume in incipient dysenteric disease.

These sago grains (as they have been called,) when latent and most vesicular in appearance, are nevertheless unlike the vesicles of Herpes, Scabies, or Sudamina, inasmuch as they cannot be emptied. However liquid their contents may appear, no pricking of them causes their collapse.

When such an one is removed and examined, while still fresh, it is evidently succulent, the little celloid and nuclear particles, making up in them the small knot or vesicle, move upon one another and alter their position (within certain limits of course,) by pressure, showing the presence of a certain amount of fluid.

When these sago grain granules have passed through their vesicular and succulent stage, and become only part and parcel of that granular state, common to all the textures of the conjunctiva at a late or chronic stage of the disorder, their progress cannot be easily traced, from the fact that we are not sure whether we have an advanced stage of the sago grain granule, or a fleshy outgrowth of the papillary and other parts of the connective tissue structures. Often, however, the vesicles are sparsely shed from the first, and run their whole course to a firm fleshy condition, with little or no affection of neighbouring parts. I have removed them in such a condition, and they range themselves under two heads.

1st. Those in which the cells remain large, unduly round, and numerous in amount, appearing to be increasing rapidly, with numerous globular nuclei. The cells of the epithelial layer about such, have departed from the normal character, and

bear evidence of rapid local increase;—are spheroidal, with granular centres, like exudation cells, and as we approach the free surface possess the characters of pus. There is an entire absence or paucity of fusiform cells in this variety, and the granules, as a whole, form a large exuberant fungous growth, succulent in appearance, and rapidly degenerating into muco-pus at the surface.

In the second variety the fleshy granule may appear almost vesicular in the centre, while it is dense, firm, and of a dull red at the circumference. These have fewer spheroidal nuclei and cells of a small size, in the central portion, corresponding with the less opaque part; while at the circumference the cells have become fusiform, or show a tendency to become oval and elongated at the extremities, conforming in character to the connective tissue layer, into which they doubtless pass.

As far as I can judge, my observations and examinations would lead me to suppose that this forms the stage of arrest or cure. This would appear to accrue from the development and contraction of the fusiform cells (while the more active and succulent nuclear particles remain as such, ceasing to generate unduly, or become absorbed). Minute vessels can be easily traced in both varieties, but the first yields far the most blood on section, judged by the number of blood globules in the field; while the latter yields fewer and more distinctly traced vessels. Indeed, a certain vascularity, around the margin and in the neighbourhood of the outgrowth, can be seen with the naked eye, and more easily traced with a lens, in the fleshy sago grains undergoing the process of arrest and cure.

When numerous little crypts of this cell formation and nuclear aggregation existed, divided and intersected by the penetration of connective tissue, the whole had the appearance exactly of a Peyerian follicle, upon a miniature scale. When the sago grain granulations disappear in the more advanced stages of the affection,—becoming merged in the generally hypertrophied condition of the inner aspect of the lids,—the disease may remain in abeyance, with an occasional recurrence of sparsely shed vesicles, which remain for some time as such,—become absorbed,—or run through a slower grade of morphosis, according to the continuance of vascular excitement or not. The vesicular bodies could hardly reappear if they had their seat in a physiological structure, because that would have been destroyed by the pathological changes incidental to the progress of the metamorphosis going on in it. It was the observation of the exhaustion of the vesicular bodies, and their reappearance

in certain cases, which led me first to doubt the existence of these glandular bodies as normal anatomical organs.

Their reappearance is traced thus:—In the interior of a chronic granulation, the central cells begin to grow, multiply, become vesicular, succulent, looser in arrangement, and mixed with granular matter; while the cells upon the periphery retain their character of fusiform cells.

Microscopic observations would induce me to think, that in the immediate neighbourhood of the acinose glands, described by Kraüse, this abnormally active germination has its origin. These glands exist particularly at the retro-tarsal folds of the upper and lower lids, and, as has been already stated, may be found near the outer canthi of the palpebræ. Now it is exactly in these situations that we find the larger vesicles, or sago grain bodies, and upon two occasions in which I removed them, I discovered a part of the racemose structure of the gland, surrounded by much granular matter, nuclei, and celloid bodies. Of the *exact* relation of these new growths to the glands on the one hand, or the surrounding stroma upon the other, I would not speak with confidence. It is almost certain to my mind that Kraüse's glands do commonly undergo some changes in granular conjunctivitis, as they appear hypertrophied, and are far more easily found in morbid than healthy lids, yet it is still more certain that the disease may arise, and sago grain granulations exist in other structures than those of the gland tissue or its stroma.

Histology then has thrown very little *positive* light upon the nature and origin of the disease. It would appear that it commences in the deeper cell surface of the conjunctiva, immediately adjacent to the connective layer. That a rapidly germinating cell growth affects minute patches of the membrane, by which the delicate areolæ of the corium become filled with a new structure of succulent character. Whether these new growths arise directly from Virchow's cells of the connective tissue I cannot pretend to say, but I regard it as the most tenable theory.

Pathology and Symptoms.

1. *Vesicles.* Slight gumming of the lids.

2. *Vesicular congestion.*—Sight weak; lacrymation in a bright light; muco-purulent shreds on lower lids.

3. *Vesicular exudation.*—First stage of granular conjunctivitis, *i.e.*, the stage when it is readily observable, and most usually comes under treatment.

4. *Purulent Ophthalmia.*—Not common.

5. *Granular Conjunctivitis.*—Usually seen when the disease is endemic:—purulent ophthalmia when epidemic.

The vesicles appear as the *primary lesion, and are the very first products generated by the morbific agency.* That these are not the sequelæ of an inflammatory process,—but rather the powerful predisposing causes to, and modifying agents of, any inflammatory phenomena that may ensue, appears certain.

In the first stages the enlargement and permanence of the vesicles are the only evidence of the disease. On depressing the lower lids, they may be seen scattered like sudamina, over the conjunctival folds,—grouped around the canthi,—or studding the whole retro-tarsal region. In appearance they closely resemble saccular glandular bodies. They lie immediately beneath the epithelial layer, upon and in the connective tissue of the conjunctiva. These bodies are eminently chronic, and may remain an indefinite time, or be absorbed, to be succeeded by others, particularly if the subject of them remain exposed to the same influences as generated or fomented the disease,—a circumstance which is unfortunately but too frequently the case with soldiers.

When dying off, one often sees them larger, more scattered, and though still transparent, of a brownish hue, with one or more small varicose vessels running across them. The upper lid is frequently free, or affected in a less degree,—no congestion, lachrymation, nor pain, indicating their presence. Perhaps when attention is directed to the point, gumming of the lids at night, and occasional itching, may be made out. There may be, and generally is, an absence of all subjective symptoms, and it requires a minute inspection of the internal aspect of the lids to discover the vesicles.

The presence of these vesicles in a great number of soldiers without attracting any attention, or producing any morbid symptoms, and the contagious nature of the disease, are a sufficient explanation of the great difficulty attending the extirpation of ophthalmia when present among troops.

The disease frequently stops at this stage, especially when the conditions favourable to its development are wanting. Out of 861 convicts examined at Gibraltar there were—

Vesicles	441
Granulations . . .	46

The remaining 374 were quite sound, excepting those in hospital (about 45), who were not examined.

Vesicular congestion is very common, and may be induced by friction, dust, cold, wind, &c.

The conjunctival congestion gives pricking pains, (or more

likely sandy irritation,) with weakness of sight in bright light, muco-purulent shreds on lower lids, and no great change in the vesicles themselves, (though they of course share the general congestion of the conjunctival mucous membrane).

Rest, in the shade; fomentations, cooling lotions, and a purge soon restore the eye; the vesicles remaining as before. In this quasi-inflamed state, a little winking in the sun, a gummy state of the eyelids in the morning, a collection of altered secretion,—forming in short a slight blenorrhagia,—occur. Let such a case be exposed to a long march, to much exposure to sun, dust, alternations of temperature, a debauch, guard mounting, night dews,—and an active stage ensues, a congestion of the palpebral conjunctiva. Effusion of plasma from the vessels, alterations of colour, opalinity, and alterations in the size and character of the contents of these sago grain granules, which, losing their pellucidity, become more and more opaque, red, and at last fleshy. At the same time the papillary bodies become affected and rapidly develope and degenerate upon the two lids—leading us to

Vesicular Exudation is the most important stage of granular conjunctivitis.

The watery bluish-red eye, the œdematous, half-closed blinking lids, and sniffling nose, plainly tell their tale of pain, intolerance of light, and inflammatory action in the lids; and now is the time that frequent inspections, with prompt and judicious treatment, will save the sight of many eyes, and months of wearing pain. There is no mistaking the disease. It is imprinted on the sufferer's face; depress his lower lids, and the palpebral conjunctiva starts into view, thickened, engorged with blood, and studded with numerous vesicles, passing through the successive phases of inflammatory action. They *become larger* by increased local growth, (hyperplasia) and seem more numerous, as those more deeply seated swell out and press to the surface;—small bloodvessels crowd around their bases, and creep over their surface, or penetrate into their interior. The effused fluid becomes pearly and pink from commencing organization, and finally the vesicle loses all specific character, and shows itself a true granulation. Papillary granulations also form in the lower lid, and the tarsal bodies of the upper lids are reddened and bristling with very fine papillary granulations, increasing in number and size, towards the canthi.

Purulent Ophthalmia.—This is not very common, when the disease does not prevail in an epidemic form. Cases, however, sporadically occur. Of course the disorder may advance at once

from the initiative vesicular stage to the purulent, without passing through any other (at least observed) stage of the disease, if the exciting causes act with sufficient intensity, and the conjunctival membrane in an equal degree responds to the morbid agencies. In the course of a few hours, a case of congested vesicular lids may pass into an acute purulent ophthalmia, as I have myself witnessed. There is great photophobia, the eyelids are œdematous; their scarcely apposed edges stick together, with morbid secretion. As soon as the lids are separated, a gush of tears and muco-pus flows from beneath them. The lids, partly from their great weight, and partly from spasmodic action of the orbicular muscle, cannot at all, or with difficulty, be separated sufficiently to expose the ocular membrane. The ball of the eye is involuntarily rolled upwards and inwards, concealing the cornea beneath the upper lid.

The ocular conjunctiva is swollen and œdematous (chemosis), and what can be seen of the cornea appears as a deeply depressed circle within the raised roll of conjunctiva. There is intense vascularity, the conjunctiva being of a scarlet hue. If the chemosed membrane be seized with forceps, drawn out, and strips cut out of it, the exudation escapes with difficulty, owing to its consistence, and in a few hours the chemotic swelling will appear as bad as ever, even if it subside after the incisions. In this condition the tendency is directly to sloughing of the cornea, or rapidly extending ulceration, escape of the aqueous humour, staphyloma iridis, with dense cicatritial tissue, keratitis, albugo, or some opacity of the cornea. In passing, it may be remarked, that if strong caustics be avoided, and copious local depletions be employed at first, these opacities clear away wonderfully in time; even the worst looking of them greatly improve, from gradual absorption of the circumferential opacities around a cicatrized ulcer,—for much of the opacity is the result of a diffused inflammation and infiltration of the superficial layers of the cornea, or mere loss of transparency, from stretching and deranging that parallelism existing in the lamellæ of the cornea proper, the maintenance of which is essential to its transparency.

As the disease recedes, normal epithelial cells begin to cover the hypertrophied conjunctiva and its papillæ. As cure becomes established, the cells which have been so rapidly produced, during the progress of the disease, assume the spindle-shaped form, become fibrous in character and shrink:—while the projecting villi become more and more smoothed down, the vascularity diminishes rapidly, and the lids appear smooth, and of a dull red aspect, rarely, if ever, perfectly returning to

the normally pale state, (if the patient remain in the same climate,) and prone to take on active local progress upon the slightest irritation. They cease at last to cause corneal disease from attrition of that structure, and a certain feebleness of sight only may remain.

This state of things does not obtain in the gonorrhœal purulent ophthalmia, a disease if anything more acute, and as much marked by all the morbid tendencies to corneal implication as the military purulent form, yet more rarely treated, and tending to a perfect cure, without the hypertrophied state of the conjunctival membrane remaining,—as a granulated, dull red mucous membrane,—such as it invariably does in the latter.

I state this as the result of observations obtained from treating cases of the two diseases in officers and men, at the same periods. In gonorrhœal ophthalmia the tendency is to the occurrence of a crescentric ulcer affecting the cornea, near its lower edge, while intense military ophthalmia gives rise, (a hazy state preceding or not,) to sloughing of that membrane.

Granular conjunctivitis almost invariably affects both eyes, either from the first, or during treatment. This is the result of the acute forms, such as the last, or arises in those who have passed through the stages described in a less acute degree. The whole of the structures become involved, both papillary, connective tissue, and glandular. The eyelids are œdematous, the patient walking about with them closed entirely, or but slightly open. They stick together with the morbid secretion from both the Meibomian and Kraüse's glands, with all the results and concomitant symptoms attending the hypertrophied and granulated condition of the membrane, modified according to the degree of vascularity that may be present. The now granular surface, rising up the epithelial structures, becomes the source of a morbid excretion, aqueous, muco-purulent, or purulent. The epithelial cells cease to cover the papillary layer, spheroidal ones taking their place, and becoming rapidly exuviated by the development of the deeper granulation cells. The upper lids become covered with soft succulent strawberry-like projections, massed together, especially in the neighbourhood of the angles, and retro-tarsal fold, where Kraüse's glands exist, while in the lower lid, the granulations are more regular, villous, pilose, and less spongy. Such granulations resemble those of an ordinary granulating wound; the superficial ones passing off as pus, while the others remain crowded together, one upon the other. The sense of the presence of foreign bodies is always present. Photophobia, the contracted brow, and confirmed ophthalmic aspect, become typically marked.

I have observed that the features tend to waste, disproportionately to the remainder of the body. The nose (particularly in those who have long ones), shows this wasting, and the patients themselves, from the disease and confinement combined, assume a chloro-anæmic aspect, suffer from dyspepsia, and become pot-bellied;—the cornea gets implicated, keratitis, pannus, or ulceration ensues, and one may perceive occasionally the posterior elastic membrane of the cornea, projecting as a hernial protrusion through the ulcer, yielding before the aqueous humour and threatening momentary rupture, which, however, it generally escapes.

As the disease assumes a more chronic form, the discharge diminishes, and is observed as a narrow film, along the palpebral sinus. The conjunctiva assumes a dense fleshy aspect, of a dull brick red, or brownish hue, in which state it long remains. Upon depressing the lids, the parallel arrangement of the granulations becomes obvious, little furrows or lines of separation appearing along the long border of the tarsal cartilage between the lines of granulations.

As these granulations diminish in number, size, and density, the deeper cells assume the spindle-shaped form, whilst absorption of the liquid and semi-organized products rapidly advances. During such retrocession of the symptoms the sago grain bodies may reappear and disappear. However protracted the case, the disease makes in the end wonderful improvement, and the lids, in very many cases, return to a nearly, (though hardly ever a perfectly) normal state; a few vesicles and granules remaining to mark the disease, while the eye is very prone to fresh inflammation and relapse. If caustics have been freely applied, or the fleshy granulations pass off by a molecular disintegration, we find minute depressed cicatrices, with little white lines running from these,—(stellate cicatrices).

Diagnosis.—Undoubtedly not all military ophthalmia is of the vesicular form. A neglected catarrhal ophthalmia may go on to granular lids; and the strumous variety of conjunctivitis, which is very common in the army, tends to a purulent ophthalmia and granular lids. Indeed, ordinary conjunctivitis, in delicate subjects, frequently produces a granular state of the palpebræ and chronic ophthalmia, without having ever been preceded or accompanied by the vesicular granulation. My own experience would lead me to infer that the catarrhal form rarely becomes purulent, and seldom affects the lids, and that granular lids are the products of either the strumous or vesicular varieties.

The vesicular granulations, which are the primary stage

of the disease, are absolutely characteristic. The diagnosis will hinge upon the following considerations:—that the inflammatory reaction of the conjunctiva follows their presence and development; that such vesicles may exist for a long time alone without any other objective symptom; that the subjective symptoms are very slight, and are dependent upon the amount of inflammatory reaction, and not upon the presence of the vesicles. In the catarrhal disease, the subjective symptoms are early evident, the ocular conjunctiva is attacked as well as the palpebral, the vesicular granulations are not present, at least in the early stage, and may be absent altogether, or only appear at a later date, when the conjunctival inflammation has existed for some period; that if they appear, they are symptomatic of such conjunctival disease, constituting a secondary, inconstant, and fugitive phenomenon, and never developing into confirmed fleshy granulations, or becoming chronic. That the catarrhal disease arises spontaneously during the action of some catarrhal cause, as a special atmospheric constitution. That it is not (*per se*) contagious, nor infectious, nor limited to certain corps or bodies of men; while the military form attacks a great many men, a single regiment, troop, or a particular room;—affects the lids, begins, and often for long continues, with vesicles;—is essentially chronic, going on to fleshy granulations, and does not cause an injected globe, but is limited (primarily at least) to the lids.

Prevalence of the Disease.—The scourge that ophthalmia proves to troops serving abroad, and to bodies of men, gregarious in their habits and mode of life, is only too well known, and as far as the Mediterranean stations are concerned, may be seen by a glance at the following analytical tables.

I have to thank Mr. Nesbitt, late of Her Majesty's Convict Establishment at Gibraltar, and now Surgeon to the Wolverhampton Hospital, for the following tables. He has also placed at my disposal an admission and discharge book of all the cases of ophthalmia occurring among the convicts from 1846 to 1859, with copious details as to causes, symptoms, duration, and treatment in each case. I stand indebted to him, moreover, for furnishing me with the results of his very extensive experience and careful observations.

The establishment consists of a hulk—the "Euryalus"—well ventilated, clean, and with good washing tanks. A prison, on shore, built of wood—a long low building, four feet above the level of the sea, to which it is open upon the north-east aspect. The prison is well drained and ventilated in itself, but occasionally offensive from decomposing seaweed, and the

accumulation of ordure about the mouths of the drains from the south part of the town, which debouch in front of the building, and disgorge immense quantities of filth after the rains of the spring and fall of the year. On the land side, the prison is bounded by a lime wall, a few feet behind, and rising to some height above it. The building is two stories high, each story being divided, by a wide corridor, into rooms or classes, constructed to hold sixteen men each, with a water-closet and washing apparatus to each. The men were too closely packed, and, when the hammocks were hung, they touched one another. The hammocks are rolled up during the day, and placed upon a shelf in the class. In 1859, the old washing-places, with a liberal supply of water, were removed, and inclined wooden troughs substituted—sixteen men washing in the same filthy water, which was afterwards used for cleansing the floor. The convicts rise early, bathe constantly during the summer, are clean in their persons, well fed, and slightly worked. From the perfect regularity and forced temperance of their habits, they are remarkably free from syphilitic and epidemic disease, as a rule. Typhoid fever, intermittent, and cholera, have however appeared among them at different times.

The Garrison of Malta.

Return showing Ophthalmia for 10 years, 1850—1860.

Years ending 31st March.	Strength of Garrison (average)	No. of Ophthalmic cases admitted.	No. Invalided for Ophthalmia.	Ophthalmia to strength per 1,000.
1850	3171	203	5	64·017
1851	2917	223	30	76·44
1852	3196	268	7	83·86
1853	3157	218	4	67·79
1854	3803	285	22	74·93
1855	3213	222	10	69 09
1856	1741	133	5	76·28
1857	7239*	1486	22	205·27
1858	6160	958	73	155·5
1859	4899	534	58	108·96

The *expeditionary* force is not included in this return, no correct returns could be obtained from the Italian Legion.

* Caused by the arrival of nine regiments from the Crimea.

Nature of the Disease.

Etiology.— Bendz considers soldiers' ophthalmia a purely local affection, residing in the conjunctiva of the lids, and due to a peculiar contagious principle, of which we know not the nature nor vehicle; that the disease takes on a specific form, though somewhat variable, and by predilection attacks the mucous glands? of the palpebral conjunctiva, secondarily affecting the papillary bodies of the lids, spreading by contagion, and, most frequently, by miasmatic means (*i. e.*, infection through the air), more rarely by more immediate or direct ways. It does not appear capable of spontaneous development under the influence of ordinary atmospheric conditions. He terms the affection an "adéno conjunctivite des paupières," of a specific form, and believes that the primary action of the virus, or contagious principle, is upon his so-called vesicular glands.

The disease is endemic in Denmark, Belgium, and Ireland. It prevails also in Malta, as I have reason to know from personal observation, in addition to the ordinary catarrhal and strumous forms of conjunctivitis. The question arises at the outset—Can an intensified catarrhal ophthalmia give rise to the so-called vesicular granulations? It is, of course, extremely difficult to exclude the possibility of any given case of catarrhal ophthalmia not having been affected by a pre-existing sago-grain granulation in a slight degree, particularly as it is certain that an ordinary catarrhal conjunctivitis, arising in one the subject of the vesicular bodies, directly tends to assume the chronic form, and become purulent or granular.

If a pure catarrhal conjunctivitis does generate this peculiar affection of the lid, it must do so very rarely indeed, and under circumstances which are themselves powerful predisposing causes of the disease, viz., among men gregarious in their mode of life, and subject to the evils of overcrowding, infected air, and defective ablutions, &c., for it is very rare to find the disease generated among the officers, their families, and the women of a regiment, although they are subjected, equally with the men, to the catarrhal forms of the malady.

The injected and irritable state of the palpebral conjunctiva to which officers are liable from the prevalence of wind, dust, glare, &c., presents a very different disease from that induced by the same exciting causes among the men; the disease contracted by the former has, with rare exceptions, a different course, appearance, and is much more amenable to treatment. The lid of an officer affected by inflammation from these causes is much injected; the Meibomian ducts are here and there

filled with concreted secretion, and the epithelium appears raised into exceedingly minute prominences, very closely aggregated together, (the merest points) and never of the large size, and sparsely shed, semi-transparent, sago-grain granulation, observed among the men.

An officer, who kindly sketched some vesicular lids for me in August, 1860, was tempted to look into his own eye, and there, sure enough, were three or four vesicles at the outer canthus of either eyelid. My attention being called to the circumstance, I took the opportunity of examining all the officers' eyes, but they were perfectly healthy, with this exception.

The vesicles in this officer's lids remained quite latent until the spring of the present year, when, (after exposure to a moist wind and dust) he got catarrhal ophthalmia. The conjunctiva now took on the form common to soldiers; numerous bodies of a similar character were rapidly evolved, and he is now the subject of granular lids.*

Defective Hygiene.—There must have been some cause, or plurality of causes, operating in order that the first case, whenever and wherever it arose, should have made its appearance; and it would be going very far to deny that a similar combination of causes should not arise again, and generate the disease, irrespective of contagion. The disease seems to have some intimate connexion with miasmatic influences, and my own experience and observation would lead me to infer that it prevails with diseases incidental to bodies of men exposed to malarious and effluvial emanations. The convicts in Gibraltar, however, seemed to be tolerably free from diseases of an epidemic type. In Malta, on the contrary, the barracks in which ophthalmia appears, yield other disorders. Typhoid or enteric fever, gastric remittent, rheumatism, and certain forms of febrile dyspepsia are common at the same time, or at different periods of the year, and during different years in the very same barracks, which yield long lists of ophthalmic disease.

It must ever remain a difficult problem to solve, the question of the causation of the disease, because, when once generated, it is so liable to spread in a regiment; even in healthy localities, where men live together, the means of ablution and ventilation are necessarily somewhat limited; nevertheless, I have no doubt that the sago-grain granulation may arise *de novo*, from the operation of the self-same con-

* Qy. His military servant had the disease in a latent form.

ditions as obtain in miasmatic disease, using the latter term in the general sense.

Some facts lately furnished me by Staff Assistant-Surgeon Dr. Frank, (himself an expert histologist, and most trustworthy observer), have a direct bearing upon the generation of the disease from unhygienic influences.

"Stromeyer found in pigs living in an unhygienic state that such grey granulations were commonly present upon the lids: between the manner of whose living, &c., and that of some men, so many connecting links may be pointed out."

Stromeyer, (and some scientific men connected with him) conceived the idea of examining the conjunctiva of animals with the view of setting at rest the question of the presence of the closed mucous follicles described by Bendz. They examined 1,000 eyes of different animals, domestic and wild. Stromeyer found that no physiological organs corresponding with the sago-grain granulation existed in pigs well tended: to wit, in pigs having "a bedroom and parlour," and clean litters; he therefore infers that they are pathological or neoplastic formations.

Stromeyer concludes that Bendz, (who had the assistance of his brother, the anatomist at Copenhagen) must have examined conjunctivæ at a time when granular ophthalmia was epidemic in that city, and that his so-called follicles were in reality not physiological but pathological formations. Stromeyer's observations would seem to prove *that given certain unhygienic conditions, this kind of ophthalmia is almost sure to follow among domestic animals.*

Dr. Frank goes on to say, "I obtained some pigs' eyes the other day, and was pleased to find that they were pigs of the lower orders. The lids were in a condition of vesicular granulation."

I have myself examined the lids of some sheep, pigs, and goats, but have not been fortunate enough to find these vesicular bodies in any instance.*

As an illustration of the generation of the vesicular lids from the operation of natural causes, irrespective of contagion, I may mention the following:—An officer, with a family of eight children, occupied a large house in Malta; six of the children slept in rooms leading one from the other, with the female domestics. The day nursery was also occupied at night. The ventilation and lighting were bad, and there was effluvia

* The etiological causes, which Stromeyer conceives to be productive of the disease, do not obtain here, for all the domestic animals live almost entirely in the open air. (Malta).

from a drain in the kitchen. These six children had vesicular lids during the spring of 1860. The seventh child slept separately, and the remaining one was an infant. The six children, I learnt, were bathed in the same water. Attention to cleanliness, ventilation, &c., and the removal to a better house, completely eradicated the disease.

Ophthalmic disease prevails endemically in Malta, and I know that the follicular-looking granulations exist in very many of the inhabitants of the lower orders, among whom the strumous and catarrhal varieties are also remarkably frequent. The predisposing causes, dirt, effluvia, defective ablution and ventilation, are rife among them; while the exciting causes are to be found in the nature of the climate, the condition of the soil, winds, dust, and glare. Whilst in Gozo, I examined the eyes of a great many children of the poorer classes. These children work in the fields with their parents during the day, and sleep in the most wretchedly confined cabins at night. Vesicular lids were very common indeed, although conjunctivitis appeared to prevail less than in the crowded city of Valetta. When the parents accompanied their children, (as they invariably do, following all strangers for the purpose of begging) I instituted inquiries as to the number of children belonging to one father, and the impression left upon my mind was decided, that where there was a large family (5—8—10), this vesicular condition of the lids was remarkably prevalent, and out of all proportion to the amount of the same disease existing in a similar number of children belonging to different parents. The people are very poor, generally have large families, sleep in wretchedly confined cabins, frequently with their domestic animals, and, judging from the appearance of their skins, could not make use of much water for the purposes of cleanliness. They lead the most healthful out-door occupation, and are remarkably healthy in aspect, though ill-nourished.

So certain do I feel that the prevalence of vesicular disease of the lids is in direct ratio to the amount and degree of defective sanitary arrangements, that I conceive that the palpebral conjunctiva offers a delicate test and evidence as to the hygienic conditions of a regiment. This peculiar condition of the conjunctiva is also occasionally seen in ophthalmia neonatorum, where the conjunctivitis may depend in all probability upon the direct application of the vaginal discharges of the mother to the conjunctival membrane of her infant. Even then such application may be quite innocuous, except under the same unhygienic conditions which prevail with those who

evince a peculiar proclivity to the disease. Indeed the "lochial atmosphere" of the room of a woman recently delivered,—its warmth, and absence of light and ventilation,—are in themselves sufficient causes for the generation of the disease.

What is the nature of the morbid agency?

Some of the men affected, have assigned as a cause the irritation caused by the products of urinary fermentation. Such a cause, however, can no longer exist. Before I had observed this disease, I well remember to have witnessed some facts among domestic animals parallel to those noticed by Stromeyer, which lend some support to this idea. Ophthalmia is not unfrequent in dogs, the apparent product of the irritation of ammoniacal fumes arising from the decomposing excreta in ill-tended stables. A large Newfoundland had a purulent ophthalmia, which was cured by removal from the stable, having previously resisted all treatment; what is still more corroborative of the truth of this, as an efficient cause in his case, the disease recurred upon the return of the dog to his quarters in the stable.

Unfortunately, at that period I had no knowledge of the relation of vesicular lids to ophthalmic disease. These facts must have been noticed and recorded by veterinary surgeons. It has been suggested to me that the emanations from the cloth, of which the soldier's uniform is made, may be a cause of the disorder in question. This is quite possible, (for I understand the cloths are prepared in a way as peculiarly offensive to ears polite), as is the stench which steams from them in a hot guard-room to sensitive noses.*

Parasitic.—My own observations afford no proof that these vesicular granulations have a parasitic origin. I have examined the scrapings of lids again and again, with this end in view, and invariably with a negative result. Wharton Jones's suggestion, that the prominent cause of granular lids might be an animal parasite, because the disorder is cured or relieved by the application of ung. sulphur, I have failed to endorse in any particular. First, the ointment gives in my hands results (identical, if not actually inferior,) to those obtained from other remedial agents. Secondly, microscopic observation fails to detect any such parasite; and the prevalence of the ocular disorder, where no scabies nor any parasitic disease prevailed generally or individually

* The expense, trouble, and extreme care entailed upon any one conducting the quantitative analysis of ammonia in the air of a barrack room have prevented my determining this as a cause of the disease. Observations lately published point to something being done in this way.

in ophthalmic cases, or during ophthalmic seasons. Of the diseases depending upon vegetable parasites, *e.g.*, sycosis, tinea tonsurans, herpes circinnatus, pityriasis versicolor, and porrigo, I may remark, that these have not co-existed with the ophthalmic disease in affected individuals, nor specially among the men of the room which the ophthalmic patients have inhabited.

During the spring of the present year, (1861) diseases of the skin and hair follicles, depending upon vegetable parasites, have been very prevalent, but ophthalmia has not only not been more but actually less, as far as the men of the Royal Artillery and Engineers are concerned, than during the same season of other years.

Is the disease an artificial or factitious one, produced by the malingering soldier?

It has not been clearly proved that the specific disorder in question, marked by the peculiar anatomical characters I have enumerated, has ever been, or could be generated by ordinary means of irritation. It may be, but *I can trace no reliable instance of its having been so produced.* That *an* ophthalmia may be so originated I have no doubt, but very considerable doubts as to whether *the* ophthalmia can be so induced. That where the vesicular disease of the lid, however small, is pre-existing, the more advanced stages of the affection can be produced, the local vascularity and irritability marvellously increased, and the disease protracted, by the application of irritants and friction on the part of malingerers, I am positive. Indeed, I may go farther, and state that I have, upon more than one occasion, had pretty positive evidence of such artificial production of a severe form of the disease from one of a slight character. In many cases the diseased state became aggravated, ameliorated, and again recurred, under circumstances so very suspicious, as to leave no doubt in my mind that the men had been tampering with their eyes. This is a far different thing, however, from asserting that all soldiers' ophthalmia arises in such a way. The fact of the disease being endemic to certain countries, its prevalence and intimate connection with European armies generally, the way in which it spreads, the periods of epidemic violence, the different classes of persons and sexes attacked by it, and the regular etiological history which it possesses, are a sufficient answer to those who totally disbelieve in soldiers' ophthalmia as a natural disease.

Occasionally, as I have shown, an officer may become the subject of the disorder. Women and children are frequently attacked. Non-commissioned officers, of steady character, long

service, and occupying lucrative local posts, have been so attacked, while (what is a very strong proof to my mind), a few of the *convicts at the Gibraltar establishment, who had nearly completed their periods of transportation, were attacked with severe forms of the disease,* and their eyesight permanently affected. Some military surgeons have thought that the men might generate or aggravate the diseased action by applying urine to their eyes. It may be so, and indeed I know that it has been in a few cases proved so; but it is quite inadequate to explain more than a very small minority of the cases, on the one hand, and on the other, there can be little doubt that the operation of other causes are both adequate, and actually do, produce the disease.

Contagion.—There can be no doubt that the disease is both contagious and infectious. Many observers are inclined to think that the spread of the disease is mainly, if not entirely, due to such agency.

Bendz, of Copenhagen, relates the origin of the disease in the Danish army, in 1851, previous to which it did not prevail. From his statements, I gather it to have been imported into Copenhagen by some prisoners of war. When peace was concluded, the Danes recruited in Schleswig, and numbers of men who had previously served in the armies of the Duchies were received into the ranks of the Danish army. An ophthalmia, marked by the peculiar appearances described, appeared in the regiments into which the recruits had been received. What is still more curious, these troops were afterwards removed from Schleswig to Copenhagen, and this ophthalmia spread rapidly, disseminating itself among the civil population, apparently through the medium of discharged soldiers. Granulations among the men afterwards recruited were found to be very frequent, *e.g.*, in 1856, 320, out of 2,600 recruits, were found to have the disease in different degrees.

Mr. Nesbitt states that granular conjunctivitis has been the plague of the convict prison at Gibraltar ever since its formation in 1842. At first, when the men were fewer, and lived in well-ventilated hulks, abundantly supplied with water, the cases were rare and unimportant; but as the prison on shore filled, the numbers attacked gradually increased (*vide* Table), until at length the cases became so disproportionate, that the strictest investigation into its causes was entered upon by the medical officers. As a result of this inquiry, it was discovered, that out of the whole number of prisoners a very large proportion were suffering from the disease in its various stages; (*vide* Tables) that the ratio was less in the "Euryalus"

than in the barrack ; that there was a close connection between granular and vesicular lids ; that those classes were free from the disease in which no granule had been confirmed, and that the great source of infection was from actual contact. In D. 9, one man (Eady) was alone found healthy, and upon inquiry he was found to be a cleanly man, who *never* washed in the ward, but waited until he could have pure water, and plenty of it. All the occupants of that class, which was the most infected of all, state positively that they were quite free from any ophthalmic taint until prisoner (Netts) was introduced and billeted upon them. This man, a careless Spaniard, was the great *foyer d'infection* from which the worst cases arose and spread. The prison itself was admirably adapted, by its imperfect arrangements, to disseminate the evil, and upon this point the shrewd and intelligent surgeon, in his Annual Report for 1859, speaks strongly. "I regret, however," he says, "to say that granular ophthalmia continues endemic amongst the prisoners. I have been unable to trace its first origin in the prison, but am induced to believe that it was introduced by some Spanish convicts, of whom several are received annually. It has most certainly been kept up by the unavoidable admixture of the men, and the faulty hygienic condition of the prison itself. In one or two instances whole wards have been attacked by the introduction of one infected prisoner. As far as I can observe at present, the disease is propagated, rather by actual contact, than by infection of the air. The great increase in the number of cases in the present year is to be attributed entirely to the confusion consequent upon the alterations which have been made in the prisons, for as the men live in wards, sixteen in each, *closely packed, they are compelled to wash all in the same trough, the same water serving each, unchanged, and then used to wash the floor.*" Time has not yet permitted a fair estimate to be formed of the value of the stringent hygienic measures adopted.* Vesicles are by no means quickly absorbed, and as long as infected men remain, so long will acute forms of the disease continue. Mr. Nesbitt conceives the vesicular disease to be the same as ophthalmia neonatorum, and that one will produce the other. He says that in February, 1861, he saw an infant with purulent ophthalmia, which quickly disappeared under the usual treatment. In the following month he attended the mother, (a woman in a very respectable social position) who was suffering from conjunctivitis of the left eye, evidently due to the presence of a number of vesicles in the lower lid, many of which were already passing through the

* Examination made in March, 1859.

earlier stages to granulation. The baby, he remarks, "rolled in a blanket, and stowed away under the bedclothes, breathing a highly concentrated "lochial" atmosphere, is in an excellent position for catching the disease, and slight carelessness, as the use of the same handkerchief, would suffice to transfer the disease to the mother."

Through the kindness of Dr. Forrest, Inspector-General of Hospitals here, I have inspected the reports of the medical officers of the regiments stationed in Malta during the prevalence of an epidemic of ophthalmia in 1856–7. From the report of the 14th Regiment, I learn that, in 1856–7, the number of ophthalmic cases was 226, out of a strength of 828 men. The history of the regiment, with regard to ophthalmia, is remarkably illustrative of the disease being of a contagious nature, and the tenacity with which it adheres to a body of men when once engendered among them. In 1848, the 14th Regiment relieved the 81st at Barbadoes, and occupied the same barracks as the outgoing 81st had done. This 81st Regiment was very unhealthy from ophthalmia, and the 14th Regiment, in that year, had 94 cases, out of a strength of 597. Ophthalmia prevailed in the regiment after its removal to Canada, as in 1842–3 there were 124 cases in 598 strength, the cases being chiefly, however, among those men who had previously suffered the disease in the West Indies. In 1849, the head-quarters of the *regiment in England was split up, with the effect of directly diminishing the amount of the disease. In* 1853–4 *there were only* 19 *cases in* 919 *strength.* The following facts were made out relative to the Malta epidemic of 1856–7. At the height of the epidemic, the regiment moved to a barrack vacated for them by the 28th Regiment, the men of which were not suffering. The disease not only remained unchecked, but actually increased in intensity, showing that there must have been other causes at work than mere defective barrack accommodation. The married soldiers suffered in the least degree—the officers' servants next. One officer only was attacked, and it is doubtful whether this was a case of the military form of ophthalmia. The women and children suffered comparatively little, and these from the catarrhal and strumous forms of conjunctivitis. To show that the exciting causes—sunlight, dust, variations of temperature, guards, &c.—were not the only and essential causes operating, we have the fact that the tailors of the regiment suffered equally with the other men, though exempt from such causes. As to the contagious nature of the disease, there are the following facts. *Direct contagion,* only one case traced—a woman and child, previously quite

healthy, took the disease after a serjeant (the husband) had been discharged from hospital.

Indirect infectious influence? Eight tailors of the 28th Regiment, healthy men, were attached to the tailors' shop of the 14th. Two of such 28th men took the disease, the remaining six were thereupon removed, and did not take the disorder. The medical officer concludes a very elaborate report with an opinion "that however abstruse the notion may appear, he has been compelled by the facts to infer that a remarkable proclivity to take the disease is engendered among the men of a regiment wherein ophthalmia exists."

The 57th Regiment, stationed in Malta during the same period, suffered also from ophthalmia; 198 cases occurred, of which 30 were relapses. The regiment commenced to suffer ophthalmia at Balaclava and Kinburn in 1855–6, and the predisposing cause was therefore present. The married soldiers suffered little or nothing from the disease; the officers' servants almost not at all; the women and children slightly, the cases which made their appearance among the latter having a constitutional or strumous origin. Three married soldiers, previously healthy, became the subjects of ophthalmia after sleeping in a tent in which two men affected with the disease were quartered. The tailors of the regiment also suffered in an equal proportion with the other men.

The 71st Highland Light Infantry had not suffered from any ophthalmia in the regiment for years. The regiment was stationed in Malta at the period of the epidemic referred to. Only 23 cases of ophthalmic disease made their appearance. These 23 cases were apparently all catarrhal ophthalmia, for the average duration of treatment with them was only eight days; the conjunctivitis was common alike to officers, men, and servants, and prevailed at different periods in a sporadic manner. In none did the disease prove chronic, nor result in granular lids. The same exciting causes were in operation of course as in the other regiments.

The 28th Regiment suffered relatively little, no cases occurring among the officers, women, and children.

The Royal Artillery, Engineers, and Malta Fencibles were comparatively exempt.

During 1860, twelve men of the Royal Artillery have suffered from this form of conjunctivitis. Seven of them belonged to No. 3 Battery, and were members of the same mess (No. 6). They occupied 12, 13, and 14 rooms at Upper St. Elmo. A convalescent from hospital, perfectly free from ophthalmia, was exposed to the influence of an ophthalmic

patient of another corps, and he had vesicular granules developed in the left eyelid. Two men belonged to a healthy battery, No. 8, one of whom, from the crowded state of the rooms of No. 8 Battery compared with No. 3, were attached to the latter battery, slept in No. 12 room, using the basins, &c., of the men of No. 6 mess. One case could not be traced. The remaining two men belonged to No. 1 Battery (healthy), caught the disease whilst prisoners in the military prison. No. 1 Battery at the time had a separate fort from the other men of the brigade. The affected men in question gave the following history:—The military prison was in a very crowded state, so that many prisoners had to be confined in the cells at Upper St. Elmo. These prisoners were not marched down to the lavatory of the prison, but washed out of two tubs, the water not being changed for each man, so that from 20 to 40 men washed in this water. A prisoner (Private S——, 15th Regiment,) was one of the first to suffer from ophthalmia, and the affected men of the Royal Artillery stated that they washed in the water used by Private S——. Until their then present attack they had never suffered from "weak" eyes. At the time of writing this report a trumpeter is under treatment for vesicular lids from No. 12 room.

I may here advert to the strongest instance, of the spread of the disease by contagion alone, which has occurred within my observation.

A married officer, holding an important staff appointment, in opulent circumstances, and residing in one of the largest and best houses in Valetta, sent for me to see one of his children suffering from ophthalmia. I was surprised to find that the child had vesicular lids, and still more so when I discovered that nearly the whole family had indubitably vesicular lids, mostly in a latent stage. The English nurse was affected, also the baby. I next discovered that a native wet-nurse had *lids advanced to a chronic and confirmed stage of the disorder*; the baby slept with her. The children were frequently all bathed in the same water. An officer of the same department, who had arrived but a few days at the station, was temporarily put up in the quarters of this affected family. His nurse and child occupied the same *day* nursery, *but slept in a separate room,* and used *separate washing utensils.* They were *perfectly free from the disorder.* These facts leave no doubt in my mind that the native wet-nurse's lids were the "fons et origo mali" in the house.

Many cases were so very well marked that I made a point of bringing them to the notice of some of the military surgeons of the station.

I have seen one eye affected, and during treatment the other eye become so, apparently from the trickling of the water used in washing, or the tears, from the affected to the healthy eye.

As far as the Danish army is concerned, at any rate, there appears to be a greater proclivity in recruits and young soldiers, compared with old ones, to take the disease.

Dr. Bendz gives the following:—Garrison of Copenhagen, 4th battalion of line, 1855, received 340 recruits; of this number, 84 brought the malady, 41 had vesicular granulations without any inflammatory reaction, 35 had vesicles, with redness and vascularity, 1 confirmed or solid granulations, and 6 the catarrhal form of the malady.

Granting, as we must do, that the disease is both infectious and contagious, it must be stated that it is not so at all times and during all stages. The Belgian and Danish observers, with Von Græfe and others, seem to have tolerably satisfactorily proved this. Eble, who has written upon this subject, observes that different degrees of intensity in the inflammation set up by these granulations also produce different and proportionate degrees of severity in the inflammation caused by their contagious agency; hence, mild and severe cases, he thinks, ought to be separated. Although the muco-purulent stage and the stage of active local progress seem to be the periods at which the contagious properties are most developed, I nevertheless believe that there is not any stage at which the disease may not spread in the direct way, as by using the same water for ablution, washing utensils, &c.

Dr. Eiselt, of Prague, has recently propounded the theory that the infectious morbific influence is due to the presence of pus cells, floating in the atmosphere, surrounding ophthalmic patients. He states that by means of M. Pouchet's aeroscope (used for the detection of floating vegetable and infusorial germs), he has discovered pus globules suspended in the air of ophthalmic wards. An important discovery, if true, but inadequate to explain all the phases of the contagious properties of ophthalmia.

Treatment.—I would premise what I have to say upon this head by remarking, that it is only intended to indicate what my own observations would lead me to suggest, with a desire (as far as practicable) to avoid any unwarranted dogmatical and positive assertions.

Prophylactic measures.—These I regard as by far the most important, as indeed I have very little faith in any mere therapeutical influence we possess over the disorder. The

measures to be pursued can be easily gleaned from the resumé at the end of this paper. Sometimes we can cause a sudden check to the progress of a threatened epidemic by finding out and removing the exciting cause, as has been well illustrated lately. The 2nd battalion 23rd Regiment removed to a barracks in Malta called "Polverista Gate." The name sufficiently indicates the prevalence of dust. Ophthalmia commenced among the men, and made rapid progress, but was quite checked by the common sense suggestion of Dr. Tydd, the regimental surgeon, viz., to water the roads and neighbourhood of the barracks.*

Time as an element in treatment.—It is astonishing what changes ensue in time, even in cases of the severest forms of the disorder. There is naturally a strong tendency to recovery. If strong caustics have been avoided, and there has been no tampering on the part of the individual, the disease, I am positive, ought very rarely indeed to eventuate in loss of vision. Protracted as recovery may be, it comes at last;—or at least so beneficial a change that the disease again appears latent, and is tolerated by the patient. The granulations smooth down, and become even. As the evidence of attrition diminishes, the corneal deposits altogether clear away, or leave behind trifling specks, where ulcers have cicatrized.

1*st Vesicular Stage* hardly admits of or requires treatment, further than perfect cleanliness, good air, removal from the exciting causes of conjunctivitis, the occasional use of a mild astringent wash. If eradication of the vesicles is aimed at, the removal of the individual entirely from a gregarious mode of life, and change of air, may procure that end.

2*nd Stage*.—A few leeches, or a larger number, proportionate to the amount of vascular engorgement; cupping; a purgative, with the use of a weak solution of alum; nitrate of silver (gr. ii.—iv., ℥i. aquæ) or bichloride of mercury, with extract of belladonna, as collyria; the frequent application of the eye-douche, or a refrigerating lotion constantly applied to the eyes, if the nervous irritability be great. These,—with confinement in a well ventilated ward, upstairs, and remote from hospital or sewage effluvia,—serve to remove the vascularity in a few days, though rarely the vesicles themselves.

My own opinion of local depletion is very high, if actively employed in acute cases, and not too long continued. The state of the eyes sympathizes with the general condition of the patient's stomach, &c., and there is a tendency in all stages for

* That Vesicular and latent disease of the lids was present in the men of the regiment long prior to this I know from personal inspections of them.

the patients to have dyspeptic symptoms, coated tongues, and pot-bellies, therefore the diet should be regulated, light, and without any stimulants. Treatment is highly successful in this stage.

3*rd Stage.—Vesicular exudation.*—The same remedies, and more vigorously applied, are indicated, particularly at the outset, but restrained by a knowledge that mere depletory remedies are both injurious and useless in the chronic stages of the disorder. Blisters prove useful; a very frequent use of the eye-douche; mild astringent collyria, mineral and vegetable, frequently varied; the use of glycerine at night to prevent gumming of the lids; exercise in the open air just before sunset, and sea-bathing. Quinine, porter, &c., only when the state of the patient requires their administration. An upstair ward is the best. Change of air, or the approach of wintry weather will often alone cure many cases.

4. *Purulent ophthalmic stage* (acute).—The plan in which I have the greatest confidence includes the following measures. The application at once of relays of leeches in large numbers, 30 to 60; cupping the temple; the administration of a purgative; belladonna ointment applied to the brow; collyria of alum (gr. v.—℥i.), nitrate of silver (gr. iii.-—℥i.), frequently dropped into the eye, and the constant application of fomentation, or better, cold irrigation steadily maintained; the division of the chemosed membrane, such treatment to be employed during the first week, say. Afterwards the application of weak collyria (frequently varied), change of ward; blisters kept open; the use of quinine and stimulants, if indicated; segregation from other and bad cases; or perfect change of air. That the application of strong caustics, or strong solutions of nitrate of silver, &c., to cut short the disease, only tends to protract it, I am quite sure; and my impression is that the keratitis and corneal deposits are greater in those cases in which strong applicants have been used, than in others more temperately treated.

5. *Granular lid stage.*—The plan of treatment is somewhat similar to that of the last, but modified by the knowledge that we are treating a disorder essentially chronic, and one which spontaneously tends to recovery in process of time. Segregation from other cases, the removal from hospital air, abundance of cold water, and a strong faith in time as an element for good, are the most important items in my mind. As to the various collyria, caustics, and special modes of treatment, so strongly recommended and vaunted at different times, all I can say is, that I have never observed any facts warranting the slightest

reliance in any one of them. Fixing the lids over the eye, and so retaining them, only answers in cases wherein a suspicion of foul play exists. As to burning down and repressing redundant granulations, by sulphate of copper, lunar caustic, &c., I firmly believe, (what the careful analysis supplied me by Mr. Nesbitt teaches) viz., that we prolong the disease and complicate it by new morbid phenomena of our own production. It ought not to be forgotten that the disease is remedied by natural processes; that to remove the old granulations you must cauterize even to the tarsal cartilage, and that the affection improves not by a merely rapid liquefaction of the cell structures of the granulations, but by a change of such cells into a fibroid tissue, concurrently with the absorption of liquid and degenerating products, and the exudation of the surface cells as muco pus. During the whole treatment we must be upon the watch that the deeper tissues do not become implicated, that a syphilitic iritis is not also making progress, or that a sclerotitis or irido-choroiditis are not set up, for then in addition to mercury, copious local depletion, and division of the cornea, with evacuation of the aqueous humour, may be required.

The state of the conjunctiva affords, too, an index to delicate barometrical changes, if we are only careful to observe them, objective and subjective symptoms becoming markedly worse during the prevalence of easterly and southerly winds, with the moist, hot sirocco; on the other hand, such symptoms rapidly improve during the prevalence of polar dry winds, or westerly ones, and during ozoniferous winds, provided they be dry ones.

The application of liquor potassæ, as directed by Mr. Dixon, I have tried in two cases. That the alkali permeates the parts, and chemically dissolves the nearest tissues, is true enough, but its application is attended with great pain. Mr. Dixon speaks of six weeks being consumed in the treatment; my scepticism suggests that the six weeks and air were the curative agents rather than the liquor potassæ.

Resumé of the preceding paper in the form of propositions.

1. That the palpebral conjunctiva contains a well-developed and very vascular connective tissue layer, with the papillary structures, Meibomian glands, and an epithelial covering, consisting of numerous cells, pavement and polygonal upon the surface, spheroidal, smaller, and in successive layers beneath, besides certain compound racemose glands (Krause's), situated in the corium layer, close to the retro-tarsal fold.

2. That various forms of ophthalmia occur in military as in civil life, particularly the catarrhal and strumous forms.

3. That military vesicular ophthalmia is a specific affection, having always the same essential characteristic features, prevailing endemically or epidemically.

4. That it commences as an affection of the connective tissue, stroma, or the cells (epithelial) placed in contact with that tissue in by far the larger number of cases; while in others, it is connected with the stroma immediately surrounding Krause's glands, in the form of vesicles. That such vesicles are not ordinarily the product of inflammatory phenomena.

5. That, although the so-called vesicular or sago-grain granulations may appear during the progress of other disorders, there is no positive evidence to prove that the catarrhal and strumous forms ordinarily generate the vesicular lid, but rather that the latter is a specific disease, which may precede, accompany, and modify any diseased state of the conjunctiva, with which it is conjoined; or that it arises concurrently with ordinary conjunctivitis, when the subjects of it are living in unhygienic conditions.

6. That the so-called vesicular lid may exist without any inconvenience or symptoms arising, and the disease may so continue in one stage and latent, for an indefinite period.

7. That, upon the occurrence of exciting causes, an inflammatory reaction occurs, limited primarily or throughout to the palpebral conjunctiva, conducting, according to its extent and duration, through all the phases and stages of the disease, from the slightest blenorrhagia, up to the most acute purulent ophthalmia.

8. That the period of maximum prevalence of the disorder is the first and commencing second quarters of the year. That solar heat, moist winds, white glaring surfaces which reflect light and heat; dust and frictions, and the heavy dews prevailing at this season, seem to be powerfully exciting causes. That the epidemic prevalence of vesicular ophthalmia during the spring and summer seems to be connected with the increased temperature, and the light rains, causing rapid decomposition, and evaporation of miasma.

9. That, although the disease rarely appears to occur spontaneously, it is more than probable that overcrowding, bad ventilation, and defective ablution, are themselves adequate to originate it. That the true vesicular ophthalmia has an intimate etiological relation with other miasmatic disorders, and that the state of the conjunctiva offers a delicate test of the hygienic state of a regiment. The prevention and removal of

this form of ophthalmia is therefore more within our control than is generally imagined.

10. That the most powerful cause of the spread of ophthalmia in a regiment is undoubtedly some morbid influence engendered by the presence of individuals suffering from the complaint. That the disorder spreads most frequently in the direct way; and the virus, whatever it may be, is of miasmatic origin, and falls within the laws of infection; such infection, proceeding from an affected individual in badly ventilated sleeping rooms during the night, and more directly through water used for ablution and washing utensils. That although the disease may possess infectious properties only during certain stages, and under certain conditions, it is probable that the disorder may be communicated directly, *during any stage*, to non-affected individuals, washing in the water which has been before used by persons the subject of this form of ophthalmia.

11. This explains how it is that a tendency to ophthalmia adheres tenaciously to the men of a regiment, and why, when an epidemic occurs, or a concurrence of exciting causes prevail, the regiment which has before suffered from ophthalmia will be sure to do so again.

12. From the fact of soldiers being gregarious, and peculiarly exposed to miasmatic influences, (while the vesicular stage manifests itself by no subjective symptoms,) we can explain how ophthalmia is a soldier's disease, and how difficult such disease, when once engendered, is of eradication.

13. This knowledge of the etiology of the disease sufficiently indicates the necessity of breaking up an affected regiment into small companies;—the prohibition of such regiments from being stationed where ophthalmia is endemic, or the exciting causes to ophthalmia of any kind exist.

14. That it points also to the necessity for the largest amount of cubic space in the barrack rooms of such regiments, for full and free ventilation; and the supply of separate washing utensils for the men, with an unlimited supply of water, and the institution of bathing parades.

15. That the strictest supervision should be exercised in the prevention of men, already affected with vesicular or granular lids, joining companies or troops exempt from that disorder.

16. That, in the treatment of the disease perfect cleanliness, upstair wards thoroughly ventilated, and giving ample cubic space, with a separation of the milder from the more acute and advanced forms of the disorder, and exercise in the open air daily, seem to be the most important indications.

17. That any treatment,—by strong caustics, collyria, &c.,—with the view of cutting short at once the disorder, not only is inadequate to reach the tissue in which the morbid process runs its course, but is productive of mischief in tending to complicate the phenomena with those of our own production, and directly leads to opacities of the cornea, and chronic alterations in the tissues of the lids, *e.g.*, entropium; ectropium; deviations of the lachrymal puncta; zerophthalmos, &c.

18. That change of air is the best of all remedies in the advanced stages and in protracted cases.

19. That the disorder is occasionally kept up by malingering soldiers, and, when a suspicion of such exists, it is well to close the affected eye entirely, by strapping, and make the treatment uncomfortable in its nature.

20. That time forms an essential element in any treatment,—a tendency to recovery from the disorder in process of time being well marked.

Results of the Examination of the Eyes on board the Euryalus, March 13th, 1859.

Total Number.	Granular Lids.	Vesicles in Lids.	Tendency to Vesicles.	Distribution.
121	2	28	5*	Main deck only occupied. Nos. 5 and 6 being allotted to the boarders. Nos. 7, 9 and 10 to working prisoners, averaging about 40 men in each class.

The arrangement of halls and numbered wards is new. The lower floor of the prison on shore is divided into two halls containing 21 wards, each ward constructed to hold 16 men. A and B upon floor. C and D halls upstairs. So that a ward in either hall has the letter and number to distinguish it, *e.g.*, A 1, D 9.

Analysis of Cases in A *Hall.*

No. of Ward.	Vesicles in Lids.	Granular Lids.	Remarks.
1	7	None	
2	11	1	
3	8	None	
4	5	..	
5	2	..	
6	5	..	
7	1	..	1 case of engorged lids.
8	4	..	
9	..	..	
10	3	..	1 tendency to granulation at canthi.
11			
12			
13			
14			

* Appearance of vesicles in these cases doubtful, rather vesicular than not, but not convincing to an unpractised eye.

Analysis of Cases in B *Hall.*

No. of Ward.	Vesicles in Lids.	Granular Lids.	Remarks.
1	9	None	1 weak eyes and congested lids.
2	5	1 slight	
3	7	1 „	
4	4	2 „	
5	12	1	
6	11	2	
7	11	2	
8	5	1	and one engorged lids not carefully noted.
9	..	..	
10	8	1	Engorged lids.
11	8	2	
12			
13			
14			

Analysis of Cases in C *Hall.*

No. of Ward.	Vesicles in Lids.	Granular Lids.	Remarks.
1	3	..	
2	2	..	
3	1	..	
4	7	..	
5	8	1	Slight.
6	7	..	
7	5	3	Chronic cases, 1 just from hospital.
8	6	..	
9	9	1	From Euryalus.
10	4	..	
11	5	..	
12	8	1	Rather granular.
13	5	..	
14	9	..	Not well marked.

Analysis of Cases in D *Hall.*

No. of Ward.	Vesicles in Lids.	Granular Lids.	Remarks.
1	7	1	
2	12	1	Slight, never treated.
3	4	1	One now in hospital.
4	10	..	One lids engorged from childhood.
5	8	..	One has had ophthalmia.
6	8	1	
7	3	1	
8	9	1	
9	5	8	One of men whose eyes were sound, did not use the same water as rest.
10	3	..	One engorged lids.
11	8	..	One has had ophthalmia.
12	4	..	
13	..	..	
14	5	1	
15	6	..	One engorged lids.
16	9	1	

Results of the Examination of the Eyes of the Prisoners in the Prison, and on board the Euryalus, March, 1859.

Location.	Strength.	Granular Lids.	Vesicles in Lids.	Tendency to Vesicles.	Sound eyes.	Ratio.
Prison ..	620	44	298	65	333	
Euryalus ..	121	2	28	5	89	

When the Euryalus was examined, the upper deck only was occupied, the lower deck having been evacuated for some months; of the wards on the upper deck, five only were used.

Nos. 5 and 6, no cases noted. Warders.

7 contained about 38 men.
Vesicular 5, Granular 0.

9 contained about 40 men.
Vesicular 16, Granular 0.

10 contained about 40 men.
Vesicular 7, Granular 1.

Analysis of Cases treated in Hospital.

	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.
January	..	..	2	..	2	2	13	3	8	3	9	1	3
February	..	..	2	..	4	2	16	4	2	3	10	8	3
March	3	2	2	2	4	1	11	2	3	10	7	4	4
April	2	2	4	5	2	..	5	20	4	5	2	8	1
May	1	1	4	..	1	..	4	12	..	5	2	5	4
June	1	..	..	..	1	2	1	5	..	4	4	5	6
July	1	4	2	..	2	1	..	4	2	4	12	7	4
August	1 relapse	1	..	4	..	1	..	3	8	5	1	4	4
September	..	1	3	..	..	..	1	1	4	4	4	2	3
October	..	2	1	..	1	4	1	2	4	4	4	..	5
November	..	2	2	1	..	8	2	3	2	3	3	1	4
December	..	..	1	..	..	12	1	1	2	11	3	4	3
Prison	8	9	14	9	11	26	39	52	31	53	57	44	35
Euryalus	..	4	8	1	4	7	15	8	8	7	4	5	9
Owen Glendower	..	2	1	2	2	..	..	..	..	1	..	..	..
Total	8	15	23	12	17	33	54	60	39	61	61	49	44
1st Quarter	3	2	6	2	10	5	40	29	13	16	26	13	10
2nd Quarter	4	3	8	5	4	2	10	24	4	14	8	18	11
3rd Quarter	1	6	5	4	2	2	1	7	14	13	17	13	11
4th Quarter	..	4	4	1	1	24	3	..	8	18	10	5	12
Total	8	15	23	12	17	33	54	60	39	61	61	49	44

Seat, Character, and Duration of the Disease.

Year.	Cases reported.	Relapses.				Idiopathic.		Eye affected.			Maximum in Hospital.	Minimum in Hospital.	Average duration in Hospital.	Results and Remarks.
						Without Corneitis.	With Corneitis.	Right.	Left.	Both.				
											days	days	days	
1846	8	..	2	1	..	5	..	not noted			53	3	17·4	1 eye lost.
1847	15	..	..	..	..	13	2	3	4	8	54	2	20·17	„
1848	23	..	4	1	1	14	9	6	7	10	206	2	21·	1 eye lost, 1 impaired.
1849	12	2	2	..	..	..	5	5	4	3	32	3	12·75	Nil.
1850	17	3	3	..	..	..	4	6	6	5	122	2	27·56	Nil.
1851	33	3	1 eye lost 3 and 2 doubtful	..	..	..	5	9	8	2 not noted 14	118	3	17·84	Granulations not noted in 5 cases.
1852	54	6	1 lost	..	..	..	6	7	11	3 not noted 32	73	3	13·32	5 granular.
1853	60	6	3, 1 lost	..	..	..	9	10	9	1 not noted 40	81	1	18·26	9 ditto.*
1854	39	7	1	..	..	..	8	7	15	3 not noted 14	..	..	..	20 ditto, 1 lost.†
1855	61	15	..	..	..	..	12	9	6	6 not noted 39	262	2	32·80	34 ditto.‡
1856	61	9	3	..	..	..	13	11	6	4 not noted 39	129	1	22·90	39 ditto, 1 lost.§
1857	49	5	1	..	1	..	18	11	7	6 not noted 25	247	2	33·16	23 ditto.
1858	44	5	3	..	..	..	11	14	6	8 not noted 14	127	1	20·05	25 ditto.

* Infection first noted, one man getting the disease from lending an ophthalmic patient his towel.
† Netts, a Spaniard, a fruitful source of the disease. ‡ Hudson, a lunatic, greatly increased the area of disease in hospital.
§ O'Lochlan's eye lost.

HEMIPLEGIA WITH CONVULSIONS.

By Africanus Horton, M.D., Edin., Staff Assistant Surgeon of Her Majesty's Forces on the Gold Coast.

It will undoubtedly be useful to state that the uneducated natives of the Gold Coast of Western Africa are very sceptical as to the superiority of European skill in medicine when compared with the random treatment of the Fetishman, and thus a case is seldom brought before him until it has arrived at its last extremity. I questioned one day one of the promoters of this silly idea their reasons for thus opposing a Fetish doctor against scientific men. "The fact is," said he, "you European doctors do not know the system of the African; for it is composed of a great number of holes running in every direction, and giving free circulation of the blood, whilst the white man has but very few holes. When an African goes to England," said he, "these holes are closed, and so he becomes diseased and dies; and when the European comes to Africa, not being provided with the necessary holes in his body, the climate becomes prejudicial to him."

The case I am about to relate is one of very great interest, and which, amongst many others, I was called to attend in the very last stage of the disease.

M.A., æt. 36, was seen by me suffering from hemiplegia with convulsions on the 10th April.

History.—Patient was in such a low condition that she could not speak. Her friends gave the following account:—About three months ago she was delivered of a healthy child, previous to which she had had three children, the eldest girl about sixteen years old. After her delivery she was never well, having complained of pain in her abdomen, which continued for some time. She improved a little, but when she began to walk about the pain returned; she was never exposed to the cold damp air of the evening. About two months ago she felt uneasiness of the left side, and was unable to move her leg or arm; this was succeeded by a slight twitching sensation, which increased rapidly until the whole of the left extremities became affected with a continued spasmodic contraction and inability to use the limbs; the face and neck afterwards became involved in the contraction, and then at intervals a convulsion of the whole body took place. She had been taking all the time native medicine without any effect.

The following were the symptoms I observed on my first

visit:—There was a general appearance of great weakness and depression of spirits; no emaciation; the left leg and arm act sparingly to the will, and were continually under a severe convulsive spasmodic contraction; the muscles of the right side of the face underwent continual twitchings; at each quarter of a minute each arm and leg is attacked with a severe spasmodic contraction; at each quarter of an hour patient complains of a creeping sensation over the region of the stomach and then a spasm of the diaphragm, leading to excessive difficulty of breathing; staring eyes, and the patient throwing herself about; the right leg and arm became irregularly contracted; afterwards the contraction became general; arms, legs, and muscles of the face and the whole body convulsed; the teeth perfectly and forcibly clenched; muscles contracted; eyes fixed and staring; breathing suspended; this state lasted only for two or three minutes, and the fit gradually subsided, but the spasmodic contraction of the lower and upper extremity still continued as before; the sight rather dull; sensibility below the ordinary standard. Digestive System.—Tongue coated with a white fur, especially towards the centre and back; the appetite bad; bowels irregular. Genito-Urinary System.—Urine scanty and high coloured, depositing a sediment; no pain or uneasiness felt in the region of the uterus. Pulmonary System.—Normal. Circulatory System.—The heart's action is weak, occasionally violent palpitation; radial pulse 90, weak. Integumentary System.—Normal.

I ordered that she should have the free use of the cold water bath, an aperient draught in the morning, and a dose of ergot of rye three times in the day.

12th.—Patient felt a little easy, but not better; the bowels sparingly opened by the medicine, but became confined again; appetite better.

Ordered, a pill composed of compound colocynth and blue pill to be taken every night, and a dose of castor-oil in the morning; a mixture, composed of assafœtida, aromatic spirits of ammonia, and Battley's sedative, to be taken every four hours.

14th.—The medicament produced a decided effect; the continued spasmodic contraction of the extremities almost abated; the fits came on every hour instead of every quarter of an hour; appetite improved; bowels opened.

Ordered, pills and mixture to be continued; the diet to be generous, with port wine, *which was obtainable.*

26th.—Patient decidedly improved, and expressed herself so; the spasm of the extremities entirely disappeared; pulse 85, strong; the fit came on now only four times a day.

28th.—Patient still improving; she suffered from slight ptyalism.

Ordered pills to be discontinued.

May 3rd.—Patient had a severe attack of dysentery, but all the other symptoms were as favourable as before. An astringent mixture was ordered.

6th.—The dysentery had stopped. I met my patient sitting up in the drawing-room; the fits now come on irregularly twice or thrice a-day, and she feels herself much better, but complains of a severe excruciating pain in the head; bowels costive.

Ordered, small doses of sulphate of zinc and laudanum, with a diaphoretic powder, to be taken three times a-day; 1 gr. of opium at bed-time; bowels to be opened with castor-oil.

9th.—Pain in the head becomes intolerable, all the other symptoms abate; she completely recovers from the ptyalism.

Ordered, head to be bathed with a cold evaporating lotion.

15th. Stomach becomes irritable, and could not retain the medicine. Ordered, a pill of sulphate of iron and quinine, and the lotion to be continued.

17th. Stomach again becomes irritable; bowels irregular; head-ache, very severe; appetite bad; fit occurs about four times a-day, but not very severe.

Ordered, a mixture of assafœtida and laudanum to be given in drops, and 1½ gr. of opium at bed time.

18th.—Patient had sleep at night; headache the same.

21st.—Patient has her appetite improved; bowels regular; feels weaker; fits come on five times a-day; the head-ache the same. Ordered, a mixture of quinine and sesquichloride of iron; to be taken three times a-day.

A day after this I received orders to remove from the detachment at Anawahoe to that at Dix Cave, a distance of about 110 miles. The last I heard of her was that the disease proved fatal.

Commentary:—This case is an addition to a great many cases where a distal irritation leads to the affection of the nervous centre. The irritation was at first in the uterus; the nervous attack was hysterical; not being checked it produced a serious irritation in the right side of the nervous centre. It would appear that the uterine circulation ceased, but that the effect on the brain had been very serious, and so the mischief continued. When the assafœtida mixture and the colocynth and blue pill were given the immediate beneficial result was remarkable, but there was an intolerable head-ache, which probably depended upon some serious injury having been produced in the brain.

CASE OF PUERPERAL CONVULSIONS AFTER DELIVERY.

By William Mair, L.R.C.P., L.R.C.S., Edin.

Case.—H. T., aged 21, married, first pregnancy, full time. Labour began at 3 p.m. on September 15, 1861; liquor amnii escaped 10.10 p.m.; child born at 10.20 p.m.; placenta expelled from the uterus at the same time; removed out of the vagina at 10.25 p.m.; no complications; had presented in the first position. Female child, living. Duration of labour, seven hours twenty minutes. She sobbed a little during the second stage of labour; gave her ʒss. of ergot to hasten the expulsion of the child.

September 16th.—I was sent for about 4 a.m. Found her in a fit. She had been convulsed for an hour. She was conscious, and talked a little before the first fit; afterwards she appeared to be quite unconscious, even in the intervals. No flooding. Abdomen distended with flatus. ℞. Calom. gr. x., Pulv. jalap. ℈j. statim. I took forty ounces of blood from her arm, put a blister on the nape of her neck; her hair was cut, and cold lotion applied; the abdomen and feet constantly fomented; sinapisms to the legs. In the morning administered a clyster of gruel and salt, a second in the forenoon, and a third in the afternoon. After each clyster there was a great discharge of fæces, which must have been lodged in the colon during labour, as there was none in the rectum during the passage of the child through the pelvis. Small doses of calomel were given, with a view to produce salivation, and antimony to nauseate. Such was the treatment pursued during the day. The convulsions became more frequent and intense each time. three and four in the hour. The pulse ranged about 98, never more, full and regular. Foamed very much; tongue brown, swollen, protruded. No motion, except those caused by the clysters. Passed water several times. Uterus contracted; lochia present.

9.30 p.m.—I put her under the influence of chloroform. Five times before midnight she opened her eyes and rolled them about; twice after 12 she opened her eyes and stared. While under the influence of the anaesthetic, the heart acted normally; pulse came down to 78. The movements of the

chest regular, equal, and of normal amount; respiration 28, easy and equal. No convulsions; perfect relaxation of all the muscles. She lay on her back. Placid expression of countenance. The distention of the abdomen went down directly she was under the influence of the chloroform. Administered ℈j of calomel.

September 17th, 2.30 A.M.—She stretched herself, turned over on her right side, and fell asleep. Stopped the inhalation. She slept naturally and looked like a person fatigued with much exercise, but otherwise she appeared to be in a gentle natural sleep.

5.30 A.M.—She awoke, sat up in bed, did not speak, looked about her, and fell back convulsed. She was again put under the influence of chloroform, but it did not arrest the convulsions; it lessened them in intensity and frequency, two and three in the hour. Pulse 88. Pupil sensible to light. Gave ℈j of calomel.

Noon.—Convulsed twice in the hour; beginning to be restless, and tossing about. Continued the inhalation.

4 P.M.—Still convulsed, but not so frequently. Impulse of heart great; pulse weaker. Respiration laboured, loud; a gurgling in the throat. Bowels moved for the first time; the motion a large one; purged several times afterwards. Continued the warm fomentations to the body and legs; sinapisms to chest and throat.

8 P.M.—Convulsions ceased, and did not return; restless; rolling the head from side to side; pupil small. Pulse 80; impulse of heart not so great. Respiration loud; no gurgling in the throat.

September 18th, 9 A.M.—Respiration stertorous; pulse very weak, slow, hardly distinguishable in the afternoon. Lochia present. Unconscious; moaning; pupil contracted, and insensible to light. Continued so without return of consciousness till 7.55 P.M., when she died.

She was a strong, stout woman; weighed twelve stone six months before her confinement; never known to have had a fit previous to her confinement; never took castor-oil, always pills, which sometimes moved her bowels, oftener not; was always costive; had a hearty appetite. Did not complain of pain in the head, giddiness, or any other premonitory symptom previous to her confinement, or previous to the first fit, though the nurse noticed a sort of drowsy look about her shortly before she was convulsed. She died 69 hours 35 minutes after her confinement; was *awake and sensible* 4 hours 40 minutes; was *awfully* convulsed 18½ hours; was *quiet* under the influence of

chloroform 5 hours; was *asleep* 3 hours; was again under the influence of chloroform 14½ hours, which *did not arrest* the convulsions as it did before, but *lessened* them in intensity and frequency; was 23 hours and 55 minutes in a *comatose* state. No post mortem.

Remarks.—It is necessary in epileptic convulsions, which are sensori-motor movements, to have impressions made on afferent nerves, which impressions are conveyed to the sensory organ from thence to the seat of the motor power in which nerve force is generated and transmitted downwards. In this case doubtless the impressions were made by the fæces in the intestines; these impressions were conducted to the seat of sensation. The seat of sensation may not in itself be the seat of consciousness, for consciousness is an attention of the mind to the impressions conveyed to the sensory seat, so there may be sensations without consciousness; or, in other words, the sensory seat may have impressions transmitted to it without the mind attending to their perception, either because the mind is abstracted, or on account of the change that has taken place in the sensory seat,—such is unconsciousness. The perception of impressions does not depend on the amount of the impressions, but on how they have been received by the sensory organ; the more gentle an impression, the more vividly do we perceive it, whereas an impression of great amount produces, according to its degree, stupor or unconsciousness. In this case doubtless the impressions were of great amount, and the loss of consciousness, at first an abstraction of the mind on account of the violence of the impressions, afterwards a change in the nervous force, till at last the nervous force was entirely lost, and there resulted a total loss of consciousness, as at the close of the case. The motor seat may be acted on either diastaltically, *i.e.*, through an influence from the sensory organ, or directly by the will. The diastaltic action, when the mind does not perceive the impression, is a state of rigidity of the muscles, then convulsions, according to the force sent from the sensory organ.

With regard to the treatment pursued in this case, there is little need for remark. The bleeding did no good. The chloroform at first completely deadened the sensibility; why afterwards it should have, in a great degree, lost this power, I know not; perhaps the impressions were greater on the sensory organ more tender to the impressions.

Part II.

ORIGINAL RESEARCHES IN PHYSIOLOGY AND MORBID ANATOMY.

ON THE ANATOMY OF MUSCULAR FIBRE.

By Samuel Martyn, M.D., M.R.C.P., Physician to the Bristol General Hospital, Lecturer on Physiology and General Anatomy at the Bristol School of Medicine.

Plate XIV.

Amongst the foremost duties which recur annually to every teacher of histology is that of demonstrating and explaining the tissue placed at the head of this paper; and although nothing can be easier than to do this for certain simpler varieties of "nonstriated" muscles, the higher forms of this tissue present—such at least has been my own experience—most annoying difficulties. A careful study of what had been already done only revealed to me that there were as many opinions as histologists, and so impossible did it seem to eliminate differences of description or representation, that I at length gave the task up in despair. During the past four years I have accordingly, from an independent point of view, examined the muscular tissue of many animals, in order to see and show what I taught; and, though far from believing that the structure can be as yet physiologically and chemically understood, I think that by thoughtful manipulation and the patience needful for getting rid of optical errors in working with very high powers, the morphological difficulties have been virtually solved, and that I can even show how so great a variety of opinions have arisen.

The difficulty, and consequent difference of opinion, is as to the ultimate structure of the highest development of the highest form of muscular fibre in mammalia; this must be made out by actual, unbiassed observation, although a more or less deductive method, in which the structure is very much inferred from the easier dissections of lower animals, has not been altogether without use. Thus Signor Amici has recently made a series of beautiful observations on the muscles of a species of fly, but has afforded a warning to future observers not to rely

on analogies, for his theory of the highest fibrillæ, deduced from the former, is, without doubt, erroneous. Professor Kölliker relies upon fibrillæ of the bug, meat fly, and river crab [Figs. 95, 96, and 114, of the Handbook, 3rd ed.]; and though Messrs. Busk and Huxley had insisted that the supposed fibrillæ were really *fibres*, he again declares in his last essay, that "Harting, Aubert, und, soviel mir bekannt, alle anderen Autoren" are of his original opinion. On the other hand, the fibre of fishes was recommended for this study by Mr. Bowman, "because they usually cleave into fibrillæ having very clear outlines," and he especially mentions the salmon, the muscles of which are highly developed, and therefore yield satisfactory results.

It is well known that the generally received idea of muscular structure in this country at least, has been derived from a study of the higher mammalia, and that a great advance was made by certain observations of Drs. Carpenter and Sharpey. A series of preparations by Mr. Lealand of muscular fibrillæ from the pig showed a structure of a more complex character than had been previously noticed, and which was subsequently found to be present in many if not most well developed fibres. In spite of the confirmation again and again of those appearances, and of re-examinations in insects, crustaceans, and fishes, no histologist, I suppose, rests finally on the figures usually reproduced in standard treatises. Thus, the author of the article "Muscle" in the Micrographic Dictionary, writes of "appearances exhibited by fibrillæ, which cannot at present be satisfactorily explained; sometimes each more highly refractive portion is divided by a dark line:" "at others, the same part appears bounded at each end by a transverse dark line, or both parts are traversed mesially by a transverse dark line." Some histologists omit to notice what has been described by others, to illustrate which I may adduce that it does not appear from about fourteen very closely printed pages on the fibrilla in Professor Kölliker's work (not all embodied in the English version) whether he had himself seen the well-known appearances figured by Dr. Carpenter (Figs. 2, 3). Thus we meet with difficulties in every direction, to overcome which in some degree has been my object, partly by a very careful appeal to nature, and partly by comparing the result with all views which seemed to be the fruits of honest and intelligent work.

I must, however, guard the reader from the notion that there is an exact limit to any one kind of minute form in the muscular system. There is no line of demarcation between "non-striated" and "striated" muscle, and the less we use for this

classification such terms as "voluntary" and "involuntary," and the like, the better. In structure, from the fusiform cells which traverse the foot of Hydra up to a fibre of the biceps, there is a steady transition, a series in which is included whatever exhibits irritability,—"quæ ab externo aliquo contactu brevior fit." Transverse striation may be found in very simple fusiform cells, as in the arterial system of reptiles, non-striated cells may be elongated into fibres having several nuclei (human pylorus), striated fibres often subdivide (extremities), or form networks (heart and tongue), or may be very indistinctly striated (œsophagus), while the sarcolemma may or may not be present. The only law of development which seems to come out distinctly is that rapidity of contraction is always in a direct ratio with clearness of transverse striation.

It will be as well to approach the very focus of dispute, the highest form of mammalian fibre, and to re-examine, aided by one of the ordinary re-agents, muscular fibre from a source which has been much relied on, viz., the loin muscles of the pig. First let a fasciculus from the delicate white fibre, after a maceration of twenty-four hours in proof spirit, be placed under the half-inch simple lens, seen by transmitted light, [I use Quekett's microscope as made by Highley,] and then carefully torn with needles. The fibres will be observed to terminate in points, few being cut across at both ends of a frustule, say half an inch long. The fibres are fusiform, their ends varying a good deal, but most of them being extremely fine. This I mention incidentally, because, though discovered by Rollett in 1856,* it seems to have often escaped notice. Much variety is also observable amongst the fibres, some of which are more translucent than others. The broad, highly refracting fibres are in a more or less advanced state of fatty degeneration, and to such an extent is this the case in delicate white meat that I have ultimately had recourse to the red and coarse fibre of more used muscles. If such a muscle be employed, more opake fibres are seen, and if, with very little fluid on the stage, the needle points be inserted into one fibre after another, some will be found to split much more readily than the rest. The further dissection of these, when isolated, is by no means so difficult as is generally supposed. It requires a steady hand, a well supported arm, and sharp needle points. The quantity of fluid must be so small that the fibre lies still while being dissected, or all is useless. It is not enough to make button-hole openings in fibres, but every part must be split again, and

* "Ueber feie Enden quergestreifter Muskelfäden." Sitzungsber d. Wiener Akad.

detached ends turned back, so as to open all the angles. Allow then a wave of fresh fluid to spread over the whole, and bring the cover into position. In this way I rarely fail to discover fibrillæ, which present all the material for further study. Under a power of 400 diameters each fibrilla is seen to consist of a row of rectangular "sarcous elements" between which there are clear spaces (Fig. 15). If the power used be increased to 1,200 diameters, and the correction of the object glass, which will be different for every fibrilla on the field, according to its depth in the fluid, carefully adjusted on Mr. Wenham's plan, a series of totally new and important points come to light.*

The first thing to be noted is the extreme rarity of *single* fibrillæ, most of those so appearing under a power of 400 diameters, are now seen to be composed of bundles, oftenest of two, sometimes of more fibrillæ. Here and there a single undisturbed fibrilla is however seen, the appearance of which is given in Figs 7 and 18c. Rectangular sarcous elements, their longitudinal axes rather the longer, and between which a pale translucent material is interposed, lie in a regular series; the intervening spaces measuring less than half the length of each sarcous element. The next point is this, that instances occur (several it may be in a single specimen) of sarcous elements separated from each other by spaces which are *more than equal* to the length of each element, and this may be seen in fibres, pieces split from fibres, bundles of two or three fibrillæ, or lastly in isolated fibrillæ. Close observation shows that this condition is due to stretching; and in fact, all muscular tissue in fine microscopic shreds, is in one of the two definite conditions, stretched and unstretched. To explain and prove this, I have figured a fortunate example (Fig. 18) in which manipulation has stretched an isolated double fibrilla; one-half has given way and curled up, the rest is tense and shows a totally different structure. I have stated above that bundles of fibrillæ appear as single ones under 400 diameters, and now it will be understood how this may happen; a bundle of two or more being stretched, the apparently simple sarcous masses are elongated, the interposed spaces widened out, and the once broad bundle assumes the relative proportions of a single fibrilla. [Compare Fig. 7 with 18 b. and 20.] We may next observe, that in stretched fibres there appears a transverse line which crosses the interposed matter half-way between the

* It may be well to observe, at the risk of tedious minuteness, that if Goadby's fluid be employed, as by Mr. Lealand, and the stratum chance to be thick, there are very few high angled objectives which will "correct" for so much refraction as then takes place.

adjacent sarcous elements. This line is not seen in unstretched fibres, and can only be understood by examining it in a single, or at most, double fibrilla, when it clearly appears as formed by a minute oblong mass with its long axis at right angles to that of the fibres (Fig. 17). In a double fibrilla there are two such bodies side by side, and into these the interposed line may be resolved (Fig. 20). In a fibrilla which is not stretched we must of course believe this interposed particle to be present, though concealed by the proximity of the sarcous elements.

So much for the transverse interposed "lines;" they are not lines, and it is equally erroneous to call them smaller sarcous elements alternating with larger ones; for, on the one hand, they appear as lines under a low power only, and, on the other, they do not appear in recent muscle, but only in fibre which has been long dead, or is hardened by certain reagents. Although they may appear, when very distinct, and especially in fibres taken from lower classes of animals, like intermediate sarcous elements,* I do not think it right, for the reasons just given, to rank them as equal or similar to the other particles. The last point of structure is, that in stretched fibrillæ, there is an *interposed grey matter* visible as well as an interposed particle (Fig. 17). The particle lies across the middle of a delicate stretched band, extending from one sarcous element to its neighbours, above and below. It is difficult to demonstrate this in many cases, and much more so in Goadby's than in a less highly refracting fluid. For years I failed in seeing any bond of union between the sarcous elements in a preparation of Mr. Lealand's, and was much perplexed by the question, how the particles maintained the linear arrangement. A preparation of my own (Fig. 17), in dilute spirit, showed the whole so easily that I was thus led to see the interposed band in the former preparation. It requires slightly oblique light, striking the fibrilla at right angles, and necessitating a very high "correction," the extent of which Messrs. Powell and Lealand specially increased for me in the $\frac{1}{12}$th.

The stretched fibrilla, as now described, furnishes the key to all the varied appearances which have been figured. It is a revelation of the structure of all fibrillæ, though, of course, by the stretching, all the relations are altered for the moment: thus, in Fig. 18, the fibrilla *a*, is a sort of explanation of the state of *c*; for, though this appearance cannot be produced by stretching a perfectly recent fibrilla, it may be so produced in muscle a long time after its death, indeed, as far as I know, for an unlimited time, provided only that the reagents have not

* Notes on Kölliker, by Messrs. Busk and Huxley.

rendered the interposed matter brittle. This, then, is the ultimate structure of muscle, and of the highest kind of muscle in all animals. With this type in our mind, we see the meaning of appearances readily made out and often figured, as in insects (Leydig), crustaceans (Kölliker), reptiles (Busk and Huxley), fishes (Bowman). The appearances described by Amici may be explained thus: in his paper,* after describing the fibre of a meat-fly, which he, along with many others, persists in believing to be a "fibrilla," he proceeds to figure the "fibrilla" of the lamb (Fig. 1). The dark spaces are composed of rods, the lines crossing the light spaces of dots, which express, he says, the "annestatura" of these rods. The fact is, that he was looking at a delicate *fibre*, stretched so as to lengthen out all its elements, make it very narrow, and show the interposed particles, though not the uniting material.

Again, there are often transverse lines to be seen, sometimes crossing the dark squares centrally, sometimes at each end (Fig. 9). Both these lines of darkness are optical, and may be varied at will by focal adjustment. They arise from the form of the stretched sarcous element, which easily becomes narrowed at its centre, and approaches slightly to the dumb-bell shape. As before stated, there are almost always two or more side by side in "a fibril," and so the apposed thinner centres, or thicker ends, produce a dark line across the corresponding part of each sarcous element. A side-line (Figs. 2, 3, 8, 16) is constantly present if the fluid be highly refracting and the glass undercorrected: thus Fig. 19 is carefully drawn from the fibrilla *a*, Fig. 18, with a lens purposely undercorrected and accurately focussed. That this is the true explanation appears from the circumstance that a similar dark line bounds a narrow halo around all objects or granules present by accident near the fibrilla, while correction of the lens removes the lines at once.

A subject on which I speak with considerable reserve, is that of the polarizing property of muscular tissue. Brücke has stated,† and his view seems to have obtained extensive credence, that each sarcous particle is a uni-axial, positive, polarizing body, the optic axis of which is longitudinal. This body is formed of minuter ones still—"Disdiaklasten," to which he ascribes the primary polarization. To some extent I have repeated his experiments on my own specimens, using mica stages and condensed light from an achromatic prism, but cannot at present agree with his conclusions. I always found

* Il Tempo, Giornale ital. di Medicina. Firenze, 1858.

† Sitzung's Berichte der Wiener Akademie. Julihcft, 1857.

the ray depolarized, much as he describes, by sarcous elements, *when they were compound* (Fig. 20), and more so as they were more compound. Single fibrillæ never had any affect, and I think that, like Amici, he was working with a bundle of many fibrillæ. In such a structure regular translucent masses of definite form are superimposed on other similar ones, and it seems quite intelligible that the whole should depolarize very powerfully as does the entire or broken fibre.

With reference to the sarcolemma, it is surprising how indistinct this structure is in the best developed fibres; indeed, in a long course of observation, it is more often invisible than the reverse. The assertion has been frequently repeated of late that nuclei occur not only on the inside of the sarcolemma, but also centrally amongst the fibrillæ: these I have never succeeded in finding. Their presence in or near sarcolemma is in by far the greatest harmony with the facts of development. I have already stated, in a previous paper on Connective Tissue, that the muscular fibre results from elongation of, and subdivision of nuclei in, a single embryonic cell, the wall of which developes into sarcolemma, while the sarcous contents are being laid down, and that no fusion of cells in a linear series ever takes place.

The question of "discs" as against "fibrillæ," is more interesting to the physiologist than might be supposed from the summary way in which most English, and polemical way in which most German, writers dispatch it. The histology of muscle is far in advance of its physiology, and the latter science requires to deal with the subject in every possible aspect. Discs, to which Mr. Bowman attached an importance, which all subsequent critics have been unable to destroy, have to my mind a deep physiological significance. During contraction of part of a fibre the transverse lines approximate, and so the discs (whether those of the sarcous particles or those of the interposed substance) can act as independent structures, which fibrillæ never do; a fibrilla, as such, does nothing. Add to this the almost obtrusive similarity of the whole structure to that of a voltaic pile, and it must be confessed that, though isolated discs and fibrillæ are the immediate results of cleavage force, the existence, especially of the former, must never be left out of sight.

Lastly, it may be fairly asked, "how *explain* the structure asserted to be that of a single fibrilla, as seen in Fig. 7, or Fig. 17?" To do this fully would, however, require more chemical knowledge of muscle than we now possess. The main fact is this: the bright, semi-fluid substance interposed between

the sarcous elements, is composed of two substances, each of which is capable of assuming a solid form. This happens in natural maceration of muscle, at all events in Crustaceans, and in higher animals under the influence of certain preservative solutions. In the ordinary, undisturbed state of fibrillæ, this change is accompanied only by a contraction and diminution of the interposed spaces, nothing being seen of the two elements separately. If, however, a fibre or fibrilla be stretched, the two elements become evident; the one a small transverse body, *coagulum;* the other an elastic, and, under the circumstances, extended band. It has appeared to me, that reagents which tend to coagulate albumen increase most the tendency of muscle to split into fibrillæ; but that, *if concentrated* (strong spirit, some acids), they prevent the isolation of fibrillæ; and, according to the view just advanced, by rendering brittle that pale clear band which represents the only ultimate link between all the adjacent masses of Syntonin.

SOME OBSERVATIONS ON THE ULTIMATE DISTRIBUTION OF NERVES, AND ON THEIR ORIGIN IN NERVOUS CENTRES.

By Lionel S. Beale, M.B., F.R.S.

1. *General Observations on the Peripheral Distribution of Nerves.*

The observations detailed in my paper "On the distributions of nerves to the elementary fibres of striped muscle,"* led me to conclude that the ultimate branches of the nerve-fibres formed a network on the surface of each elementary fibre which was intimately connected with the sarcolemma. This terminal network is composed of delicate flattened fibres which exhibit a granular appearance. Connected with these fibres at short intervals are oval nuclei which take part in the formation of new nerve fibres, and are probably the organs by which the nerve fibres are brought into relation with the muscular tissue.

Kühne has recently published a memoir on the same subject, and arrives at the conclusion that the nerve fibres *terminate* in the oval bodies I have described, and which were formerly considered to be nuclei of the sarcolemma. In his drawings, nuclei are represented in the course of the fibres, but each fibre is made to end in one terminal oval nucleus or corpuscle beneath the sarcolemma. Kühne's former researches

* Phil. Trans. 1860.

are referred to in my paper. Setting aside minor points of difference, the main question at issue is this:—Do nerves terminate by free extremities on or in the muscular fibre, or do the finest branches form a network so that there is no true *termination* to the terminal branches of each individual fibre?

The conclusions of most observers are certainly in favour of the former view,—and not only as regards the distribution of nerves to muscle,—for it seems to be a general opinion that the ultimate nerve fibres end, so to say, in or upon the tissue to which they are distributed. Some hold that nerves terminate in pointed or club-shaped extremities; and other physiologists consider that they pass into the tissue and perhaps become continuous with some of its elements. In some organs, nerves have been traced into structures resembling epithelial cells.

The opinion that a nerve fibre commences in a nervous centre, and after perhaps a circuitous course, terminates in the tissue, seems generally accepted, although there is much difference as to its precise relation to the vesicle at its central, and to the elements of the tissue at its peripheral, extremity. It is supposed, in the case of motor nerves, that the motor impulse starting from the centre passes along the nerve fibres, and exerts its influence upon the terminal branches; and that in the case of sensitive fibres, impressions are conveyed in an opposite direction towards the nervous centre. This inquiry as to the origin and termination of nerve fibres, it need hardly be said, is a most important one, for it involves much more than the mere anatomical question. The view we are led to take as to the nature of nervous action generally, will be much influenced, if not determined, by the conclusions arrived at with reference to the origin and distribution of the nerves. I propose, therefore, in the first place, to offer some very general remarks upon the results of my investigations, and then to describe in detail, with the aid of drawings, the distribution of nerve fibres to particular tissues both in man and animals.

The conclusions at which I have arrived from actual observation are in some respects singularly opposed to those generally entertained.

The specimens upon which my views as to the termination of nerves in muscle were founded, more than two years ago, still exhibit the appearances I have described, and almost all the statements I have to make result from observations upon specimens which can be examined by any one interested in the questions at issue. Since 1860 I have examined several other specimens of muscular fibre of man and the lower animals, and have not seen any appearances which lead me to doubt the

correctness of the conclusions at which I then arrived. Nerves distributed to muscular fibres always form a network, and I have never been able to find *terminal* fibres, as have been figured by Kölliker, and very elaborately by Kühne in his memoir just published.

Many observations have been made upon the distribution of nerves upon sensitive surfaces, and in all cases I have demonstrative evidence of the existence of a network. The nuclei connected with the fibres of the network divide, and thus new fibres are formed, while some of the old ones degenerate and leave delicate fibres of connective tissue, which still remain in connection with active nerve fibres.* The course of the fibres of this network is very complicated and the fibres are continually changing the plane in which they ramify. It is difficult to trace an individual fibre, and many of the finest fibres exhibit appearances which lead to the inference they are not single separate fibres. They vary much in diameter. Most of the fibres to which I allude are less than the 1–20,000th of an English inch in diameter, and are well defined by my twenty-sixth of an inch power. In some cases there is reason to doubt that fibres which are under the 1-50,000th of an inch, are actually single fibres. I shall discuss this subject in a paper on the Anatomy of Nerve Fibres at their distribution in the next number of the Archives. The fibres of this network do not anastomose together after the manner of a capillary network, but it seems to be formed by a vast number of distinct fibres, not one of which can be traced for any distance. Two or more fibres may run parallel to one another for a short distance, diverge in different directions, and each run parallel with a new fibre. These again soon separate as before, and pass on with other fibres. It is, therefore, much easier to give an idea of the arrangement of this network by a drawing than by description.

In no case have I been able to trace a separate fibre to this terminal network. The terminal network is connected with fibres forming, so to say, coarser networks, and these are formed by the division of bundles of nerve fibres. At the points where even the finest trunks give off branches, the same fact so constant with regard to the large compound trunks is observed, viz., that the branches are seen to pass in opposite directions, as if some fibres passed towards the periphery, while others passed towards the centre; just as in the case of the roots of the spinal nerves, as described by Lockhart Clarke, some fibres seem to pass downwards while others pass upwards towards the

* On the relation of nerves to connective tissue see my lecture on the Anatomy of Tissues, Archives, p. 109—113, of the present volume.

brain,—and in ganglia, where fibres from the same point are seen to run in opposite directions.

I have never seen a papilla (skin, tongue, fauces, &c.,) either in man or animals in which I could feel sure only one fibre existed, while there is no difficulty in finding papillæ supplied by two or more fibres. On smooth surfaces, amongst the fibres of involuntary muscle, as of the bladder and intestines, in the peritoneum, on the external surface of arteries, beneath the skin and mucous membranes, in the periosteum, in the cornea, and other tissues, the existence of a nervous network has been demonstrated.

The conclusion from these facts is, that the fibres connected with every peripheral oval body or nucleus, pass in two different directions, and that therefore there is *no termination to the nerves in the sense in which this word is usually employed.*

The Pacinian corpuscle will doubtless occur to the reader as a structure in which the nerve fibre may be seen to terminate, but several specimens which I have prepared of these beautiful organs, demonstrate an arrangement different to that generally described, and show that immediately around the so-called axis cylinder there is a tissue which possesses a peculiar structure. The lobes into which the axis cylinder divides, turn down and are continuous with some of the nuclei connected with the capsules, but it is useless to attempt to describe the arrangement without the aid of careful drawings, and the subject must therefore be considered separately.

2. *General Observations on the Origin of Nerves from Centres.*

In the next place, as to the origin of nerves from nervous centres. The opinion that vesicles may influence fibres which are not distinctly connected with them in structure, seems to have been generally accepted. It has been stated that some vesicles are not connected with any fibres at all, that others give off a single fibre (unipolar cells), that some give off two (bipolar cells), while from other vesicles a great number of fibres radiate in different directions (multipolar cells). Most observers describe these essentially different arrangements in the nervous centres, and many others which, like them, involve different principles of action, have been pointed out by anatomists; but more exact observation, or stronger evidence derived from experiment, than has yet been obtained, is required, before we can accept the conclusion that the relation of a nerve fibre to its vesicle or cell may be so different in different organs, or in different parts of the same organ,—that in one case the fibre

must be in bodily connection with the cell to be influenced by it, while in another, the fibrous capsule of the cell and the white substance of the nerve fibre offer no impediment to the action of the cell upon the axis cylinder which is separated from it by these thick non-conducting protective coverings.

The part of the nerve fibre surrounded with the white substance of Schwann, is invariably that which intervenes between the origin or origins of the fibre from the centre and its distribution at the periphery. This portion of the nerve fibre is *protected from* the influence of ganglion cells which it may pass, and it cannot influence any tissues which may surround it in this part of its course.

It is generally believed that the vesicles in the ganglia of the sympathetic system are enveloped in a sheath of connective tissue, and that a modified form of connective tissue (gray or gelatinous fibres) exists in considerable quantity amongst the true nerve fibres in these nerves. The mode of development of the 'connective tissue capsule' of the ganglion cells and of the fibres of 'connective tissue' has not been described, nor have the uses of these structures been determined.

In my lectures on the "Structure and Growth of the Tissues," Plate X, Figs. 65 and 66,* I have given drawings of ganglion cells, with numerous fibres continuous with them from a ganglion in the pericardium of the ox. I have shown that the fibres of the so-called connective tissue capsule are continuous with the substance of the outer part of the ganglion cell, and that the fibres in the nerve are continuous with these in every case. In fact, these fibres, which contain numerous nuclei, pass off from the outer part of the ganglion cell, and after coursing round this cell, leave it and pursue a longitudinal course in the fibre. As there are no dark-bordered fibres (fibres with the white substance of Schwann) in relation with many of these ganglia, we are forced to conclude:—*either that these are not ganglion cells and nerve fibres at all, or that ganglion cells exist in immense number in relation with a modified form of connective tissue, destitute of nerve fibres altogether, or that these numerous fibres in connection with the substance of the ganglion cells are true nerve fibres,* as Remak, and Todd and Bowman, and others, formerly supposed. It seems to me that the last conclusion is the only one that can possibly be accepted. I therefore regard these as true nerve fibres, resembling in their general appearance the ultimate fibres of distribution of the ordinary dark-bordered nerve fibres. In favour of this view I have a great number of observations.

* See also Plate IX, fig. 40, of the present Volume.

In the *multipolar* ganglion cells, it is clearly possible that some fibres should establish communications with other cells, while some may pass to the periphery, and others pursue a long circuitous course, and at last join nervous centres in different parts of the body. A similar arrangement is possible in the case of the *bipolar* cells, if the fibres divide into several branches at a short distance from their origin from the cell. The existence of a cell with *only a single fibre* proceeding from it, seems in favour of the view, that a single fibre may arise from a centre and pass to its point of distribution. But it is very difficult to demonstrate the fact that but one fibre leaves the cell. I have many specimens in which the fibres are so very fine and delicate, that they are only visible in fortunate specimens which have become very transparent by long immersion in glycerine. In many cases where ganglion cells appeared destitute of any fibre whatever, I have succeeded in demonstrating the existence of several arising from different parts of the cell, and many observations have led me to the conclusion that it must be very difficult to prove the absence of fibres in connection with the nerve cells. My own conclusion is, *that all nerve cells without exception are connected with or pass into fibres, and that there are no free nerve cells whatever.* In large insects, it is possible to demonstrate, by using the 1–26th, very fine fibres coming off from different parts of ganglion cells; while in small insects the ganglia may be seen, and the cells demonstrated, but the fibres coming from them are too fine to be visible. Yet in such a case as this, the evidence in favour of the existence of the fibres is perfectly conclusive and incontrovertible, though they may for ever remain invisible to us. If we do not accept this conclusion, we must be prepared to maintain that the movements of a small fly, for example, depend upon a mechanism totally different to that which can be actually demonstrated in a species of the same genus or class of much larger size.

I shall give drawings of flask-shaped nerve cells from the frog, which appear unipolar, but from every one of which at least *two distinct* fibres arise. Not only can these be demonstrated in almost every cell, but the fibres arise from different parts of the cell,—one from the central part, and the other from the circumference,—a fact of great interest and importance.

Inferences from the above Conclusions.

The general conclusion to which I have been led, from the careful examination of a great number of specimens, may be briefly stated thus :—that in all cases, nerves are

continuous with the matter of nerve or ganglion cells in the nervous centres, and with small masses of vesicular matter (nuclei, or corpuscles) which may be triangular, oval, or may exhibit other forms, at the periphery. It is only through the influence of these bodies that nerves can be brought into relation with any tissue, and these are the structures upon which the growth, multiplication, and repair of the fibres at their distribution alone depend.

I shall bring forward many anatomical facts which seem to me to render it very probable, that a fibre passing *from* a cell in a nervous centre returns *to* the same cell. Its course may be very long and circuitous, and it may have numerous connections with other cells and fibres in different parts of its course, but still a complete and uninterrupted *circuit* exists. Within this there may be, so to say, smaller circuits. Every cell probably forms part of a circuit, and is invariably connected with other cells by fibres which pursue opposite directions. When a fibre grows it does not *shoot* out from the cell and spread outwards into the tissues, but the cell, or rather its germinal matter, divides, the new mass remaining in connection with the original one by fibres formed at its two extremities. This process is continued until many new fibres and nuclei result. At the same time the elements of the tissue around the nerve fibre are growing, and the peripheral nuclei become separated farther and farther from the centre from which they originated, but remain in connection with it by at least two fibres. These inferences are derived from actual observation of structure. One may perhaps be pardoned for offering, in very few words, crude suggestions as to the office of the structures described, for it is impossible to study the structure of a tissue or organ without speculating upon the manner in which the mechanism may act during life. Any disturbance taking place in the composition of the substances entering into the formation of cells, or elementary parts, must be accompanied by electrical disturbance, but it is only in the nervous system that we find an arrangement by which these currents may influence distant parts, where they may effect many changes and may excite new disturbances. The existence of a network of delicate nerve fibres around every elementary fibre of voluntary muscle almost necessarily leads us to the inference that muscular contraction is due to a polar state of the nerve fibres which encircle the muscle, momentarily induced by electricity or by the manifestation of some force closely allied, and perhaps correllated, to it, the development of which is due to physical changes occurring in central or in central and peripheral nerve-cells. The

Plate XII.

To illustrate Dr. Marston's Paper on Ophthalmia.

Diagram taken from a case of 'vesicular' lids with slight inflammation. Magnified. The drawing does not give so good an idea of the appearance as could be wished.

Plate XIII.

To illustrate Dr. Marston's Paper on Ophthalmia.

Fig. 1. Appearance of large vesicles removed from outer canthus at the retro-tarsal fold, close to the site of Kraüse's glands, magnified by a simple lens. Three vesicles in stage of vesicular congestion.

Fig. 2. Sago-grain bodies from the lid of G. Etheridge. The bodies had the appearance exactly of Sudamina, so translucent were they; but no collapse ensued upon pricking the vesicles. Obtained by transfixion with fine needle. Lower lid. The collections of cells are not represented sufficiently granular in the drawing.

Fig. 3. Appearance of cells in a small portion of granular lid, raised by a needle and removed. Chronic case. Disease in abeyance. Granulations firm, fleshy, with a smooth surface. Old granulation tissue, like cells upon the deeper wall of a sinus.

Fig. 4. More advanced stage, spindle shaped. Acetic acid has been added.

Fig. 5. Preparation shewing a simple follicle (crypt) from a normal eyelid. The interior contains granular cell-like bodies (masses of germinal matter) × 250. The boundary wall of the follicle is made too distinct and abrupt in the engraving. In nature the demarcation between the contents of the crypt and the surrounding tissue is made out with difficulty.

Plate XIV.

To illustrate Dr. Martyn's Paper on the Anatomy of Muscular Fibre.

Fig. 1. Muscular fibre of the lamb, × 2,000. [Amici].

Figs. 2, 3. Ultimate fibrillæ of striped muscle. [Carpenter].

Fig. 4. True fibrilla of river crab. [Kölliker].

Figs. 5, 6. Fibrillæ, "not true fibrillæ, but Fäserchen;" natural maceration of river crab, the bright zones showing a dark line across them. [Kölliker].

Fig. 7. True fibrilla, undisturbed state, × 1,200 diams. This, as well as 17, 18, 19, 20, is taken from fibre of the pig. [Mihi].

Figs. 8, 9, 10, 11, 12, 13. Various appearances exhibited by fibrillæ "which cannot at present be satisfactorily explained." [Mic. Dict. Art. Muscle].

Fig. 14. Fibre of lobster, in alcohol. [Mic. Dict.].

Fig. 15. Single fibrilla, × 300. [Todd and Bowman].

Fig. 16. Single fibrilla from pig. [Sharpey].

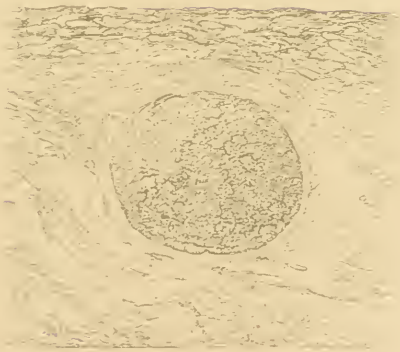
Fig. 17. Single fibrilla, much stretched, × 1,200. [Mihi].

Fig. 18. A double fibril (*b*), much stretched. (Prep. partly by Mr. Lealand). At *c*, a part has broken from the violence used. Faint 'interposed' matter unites the particles, the arrangement of which in the stretched and unstretched parts (*a* and *) is contrasted.

Fig. 19. The part of Fig. 18, marked *a*, seen with an under-corrected object glass.

Fig. 20. A double fibril, stretched, as at 18, *b*; this, and 17 are preparations in proof spirit dissected after 20 hours' maceration.

Figs. 17, 18, 19, 20 are magnified 1,200 diameters. [Mihi].



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This volume contains four coloured plates, part of the expense of which has been most liberally borne by the authors of the papers which they illustrate. It is hoped that the care with which the plates have been executed, will in some measure compensate for the smaller number in the present volume.

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THE RIGHT HON. SIR J. T. COLERIDGE.

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PRINCIPAL.

REV. RICHARD WILLIAM JELF, D.D.

SECRETARY.

JOHN WILLIAM CUNNINGHAM, ESQ.

N.B.—The next day fixed for the Examination of Candidates for admission into this Department, is Wednesday, October 1, 1862.

KING'S COLLEGE LONDON.

Theological Department.

The object in view in this Department of King's College is to provide a system of sound Theological Instruction, essentially practical in its nature, for the large and important class of young men who propose to offer themselves as Candidates for Holy Orders.

This department is under the immediate superintendence of the Principal of King's College, who lectures twice in each week on the 39 Articles, and is conducted by

The Rev. A. McCaul, D.D. . . .	Professor of the "Exegesis of the Old Testament."
	Professor of "Hebrew and Rabbinical Literature."
	Professor of "Ecclesiastical History."
The Very Rev. the Dean of Exeter, B.D.	Professor of the "Exegesis of the New Testament."
The Rev. E. H. Plumptre, M.A.	Professor of "Pastoral Theology."
The Rev. J. J. S. Perowne, M.A.	Lecturer in "Divinity," including "the Evidences."
	Lecturer in "Hebrew and Rabbinical Literature."
John Hullah, Esq.	Professor of "Vocal Music."
Rev. A. S. Thelwall, M.A. . . .	Lecturer in "Public Reading."

The superintendence of the Choir is entrusted to W. H. Monk, Esq.; and the Lectures on Public Health are given by W. A. Guy, Esq. M.B. Cantab.

The course of Instruction in this Department embraces the Evidences of Natural and Revealed Religion; the Holy Scriptures in the Original Languages; the Thirty-nine Articles of Religion; the Book of Common Prayer; Ecclesiastical History, both Ancient and Modern; and the theory and practice of the Pastoral Office, including the reading of the Liturgy, and the composition and delivery of Sermons. Measures also are taken for providing the Students with the opportunity of acting as District Visitors under the Parochial Clergy, and also for enabling them to become practically acquainted with the best methods of conducting Schools. A course of eight Lectures on Public Health, in all its bearings, is given in the Lent Term of each year. Instruction is also given within the College in the theory and practice of Congregational Singing.

The following persons are admitted Students of this Department:—

1. All Students of King's College, London, who, having passed three years in the Department of General Literature and Science, and fulfilled the required conditions, shall have received the Diploma of an Associate.

2. All Graduates of the Universities of Oxford, Cambridge, and Durham.

3. All persons of the age of twenty-one, who, after having been examined and reported as eligible by the Principal, shall obtain the recommendation of a Bishop. The necessary qualifications are, the Four Gospels in Greek; a knowledge of the Historical Books of the Old Testament; a thorough acquaintance with the Church Catechism, with Scripture proofs; a* *grammatical* knowledge of some one Greek, and some one Latin Classical book, which may be selected by the Candidate himself; Latin and Greek Grammar; and Bacon's Essays. An acquaintance with a small pamphlet (Initia Hebraica) of four pages on the Hebrew Alphabet, by the Rev. A. M'Caul, D.D., is also expected; this may be purchased at the Secretary's Office, King's College, price 6*d.*, or by post 7*d.*

Associates of King's College, London, and Graduates of Oxford, Cambridge, or Durham, will be admitted on producing testimonials from their respective Colleges; and every other Candidate must send to the Principal, seven days previous to the examination, a written application for admission, accompanied by a certificate of good moral and religious character from the Clergyman of his parish, or of the parish in which he has last resided. The names of one or more friends to whom the Candidate is well known, must also be given as Referees. The form of application may be obtained by application to the Secretary.

Previously to Matriculation each Student must subscribe the Thirty-nine Articles of Religion, as well as a declaration that he will conform to all the rules and regulations of the College.

Persons already in Deacons' Orders, desirous of preparing themselves as Candidates for Priests' Orders, as well as Graduates of Oxford, Cambridge, and Durham, are permitted to attend the Theological Course for such length of time as they may desire; but, in the case of all other Students, the Course of Study must be continued during at least Six Academical Terms (two years). Examinations take place in each of the several branches of instruction every Term, and a probationary *vivâ voce* must be passed by every Student in his fourth or fifth Term. At the close of the course of two years a strict examination takes place; and to all Students who have merited such a distinction by their attainments, and by their good character during the period of their Studies in King's College, the Principal is empowered by the Council to grant a Certificate of attainments, which may be exhibited for the satisfaction of that Bishop to whom any Student may apply to be admitted as a Candidate for Holy Orders.

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* The choice of books to be brought up is to be made from the following List:—

HOMER.—Books I. II. III.
ONE GREEK TRAGEDY.
HERODOTUS.—Book II., or any two other Books.
THUCYDIDES.—One Book.
XENOPHON.—"Cyropædia. Books I. II. III.
——— "Anabasis." Books I. II. III.
CICERO.—"De Officiis."
——— "De Natura Deorum."
CICERO.—"De Finibus."
CÆSAR.—"De Bello Gallico." Three Books.
SALLUST.
LIVY.—Two Books.
TACITUS.—"De Moribus Germanorum," and "Agricola."
VIRGIL.—Three Books of the Æneid, or the Georgics.
HORACE.—The Odes; the Satires; or the Epistles.

The two Archbishops and twenty-five of the Bishops have consented to admit as Candidates for Holy Orders those Students who shall produce the College Certificate. The Bishop of Ely, *for local reasons only*, does not recognise the College Certificate.

Theological Associates, being in Holy Orders, are permitted, subject in each case to the Principal's approval, to wear a distinctive Hood; for particulars see the Calendar.

The Board of Examiners hold examinations for Certificates at the *end* of the Michaelmas, Lent, and Easter Terms.

The Fees for attending the full prescribed Course are 8*l.* 8*s.* per Term for Graduates of Oxford, Cambridge, and Durham; 10*l.* 10*s.* per Term for all Associates of King's College, London; and 12*l.* 12*s.* per Term for all other Students. The Fees for the first two Terms must, except by special permission, be paid upon entrance, in addition to the following: viz.—

Matriculation Fees Library Cap and Gown The Calendar	£5 15 6

The Academical Year consists of Three Terms; viz.—

Michaelmas Term, from about the 1st of October to the week before Christmas.

Lent Term, from about the 20th of January to the week before Easter.

Easter Term, from about ten days after Easter to the end of June.

A Syllabus of the Lectures, giving the exact days and hours of each, is published every Term, and may be obtained in the College Office.

OCCASIONAL STUDENTS.

Gentlemen not wishing to attend the whole Course, may select any one or more subjects, at the following Fees:—

		Fees per Term. £ s. d.			£ s. d.
Ecclesiastical History	Rev. A. M'Caul, D.D.	3	3	0	
Hebrew Exegesis of the Old Testament	Rev. A. M'Caul, D.D.	4	4	0	or 3 3 0 / 2 2 0
Exegesis of the New Testament	The Dean of Exeter, B.D. / Rev. E. H. Plumtre, M.A.	3	3	0	or 2 2 0 / 2 2 0
Pastoral Theology	Rev. E. H. Plumptre, M.A.	2	2	0	
The Evidences	Rev. J. J. S. Perowne	2	2	0	
Public Reading	Rev. A. S. Thelwall, M.A.	2	2	0	
Vocal Music	John Hullah, Esq. / W. H. Monk, Esq.	1	1	0	
Public Health	W. A. Guy, Esq. M.B.	1	1	0	

RESIDENCE IN COLLEGE.

Residence is provided within the College precincts for a limited number of Students.

Terms.—The amount to be paid for residence varies, according to the position of the rooms, from £50 to £60 per annum; in which amount is included the whole expense of, rent for furnished rooms, and attendance throughout the year; Coals, during the Michaelmas and Lent Terms; and Dinner in the College Hall, during the time that lectures continue. See page 23.

CLASS OF CANDIDATES FOR ADMISSION INTO THE THEOLOGICAL DEPARTMENT.

With the view of preparing those gentlemen who are not yet qualified to pass the examination for admission into the Theological Department, a Class is established, in which instruction in the Latin and Greek Languages is given daily. The elements of Hebrew are also taught.

Lecturer in Divinity.

Rev. Alexander I. McCaul, M.A.

Any person, twenty years of age, may enter this Class for such length of time as he may desire, upon producing a Certificate of good moral conduct from the Clergyman of the last place in which he has resided.

The instruction given varies according to the proficiency of each Student; but all Students of this Class are required to attend the Chaplain's Lecture on Thursday and Saturday.

Hours of attendance, from ten to two daily.

The Fees amount to £8 8*s.* per Term, which sum covers every expense, except the Entrance Fees, which are £5 15*s.* 6*d.*, as in the Theological Department. Upon joining that Department, the Student will not have to pay the Entrance Fees again.

N.B.—The next day fixed for the admission of new Students, is Thursday, October 2, 1862.

KING'S COLLEGE, LONDON.

Department of General Literature and Science.

GENERAL SECTION.

This Department is intended to prepare Students for the Universities, for Holy Orders, for the Bar and other professions, and for competition for appointments in the Civil Service of her Majesty's Government at home, in India, and in the Colonies.

The regular Course of Education comprises—

Religious Instruction, according to the principles of the United Church of England and Ireland, by the Rev. R. W. Jelf, D.D. Principal, and the Rev. E. H. Plumptre, M.A. late Fellow of Brasenose College, Oxford.

The Greek and Latin Classics, by the Rev. R. W. Browne, M.A. late Fellow and Tutor of St. John's College, Oxford, Professor; Rev. C. H. O. Daniel, M.A. Scholar of Worcester College, Oxford, Lecturer; and the Rev. J. J. Heywood, M.A. of Trinity College, Cambridge, Assistant Lecturer.

Mathematics, by the Rev. T. G. Hall, M.A. late Fellow and Tutor of Magdalene College, Cambridge, Professor; the Rev. T. A. Cock, M.A. of Trinity College, Cambridge, Lecturer; and Rev. W. Howse, M.A. of St. John's College, Cambridge, Assistant Lecturer.

Modern History, by C. H. Pearson, Esq. M.A. Fellow of Oriel College, Oxford, Professor.

The English Language and Literature, Composition, &c. by the Rev. J. S. Brewer, M.A. of Queen's College, Oxford, Professor.

French Literature and Language, by Alphonse Mariette, M.A. Professor, and Léonce Stievenard, Lecturer.

German Literature and Language, by Adolphus Bernays, Ph.D. Professor.

The Fees for Matriculated Students, *i. e.* for those who are admitted to the regular and prescribed course of Study, amount to 11*l.* 5*s.* per term. The Fees for the first two terms are paid upon Matriculation, in addition to the following:—

Matriculation Fees	£5 15 6
Library	
Cap and Gown	
The Calendar	

Previously to Matriculation, Students are required to produce a testimonial of good conduct from their last instructor, and to subscribe a declaration, that they will conform to all the Rules and Regulations of the College.

Except in special cases, no one is admitted under sixteen years of age.

Chapel.—The duties of the day commence with Prayers in the Chapel, at Ten o'Clock precisely. The presence of all Matriculated Students is required. A register of their attendance is kept.

The Academical Year consists of *Three Terms*; viz. *Michaelmas Term*, from the beginning of October to the week before Christmas; *Lent Term*, from the middle of January to the week before Easter; *Easter Term*, from Easter to the beginning of July.

Examinations.—There are Examinations at the end of the Michaelmas and Easter Terms when the Students are classed according to their proficiency. The Examination at the close of the Academical Year is followed by a public Distribution of Prizes.

SCHOLARSHIPS. The following are given every year in this Department:—

One of £50 every year, in Modern History.
One of £50 „ in English Literature. } See next page.
One of £40 „ in Classics, and one of £40 in Mathematics, for two years.
One of £30 „ „ and one of £30 in ditto.
One of £20 „ „ and one of £20 in ditto.
One of £30 „ in Divinity, (open to other Departments).

Students who have pursued their Studies in this Department of the College for three years, and have fulfilled the required conditions, are entitled, under rules laid down in the Calendar, to the Diploma of "Associate of King's College." This privilege is also extended to all Students who have passed through a Course of *two* years' study at the College, if they have previously passed *two* years either in King's College School, or in one of the Schools in Union, and had passed at least one term in the highest form of that School before leaving it.

Students of this Department, who have obtained the Diploma of "Associate of King's College," are entitled to enter the Theological Department, with the view of becoming Candidates for Holy Orders.

Dinner is provided in the College Hall every day at 6 o'clock for such Students as may wish to avail themselves of that accommodation.

Residence of Students.—Rooms are provided within the walls of the College for the residence of a limited number of Matriculated Students. The Censor of the College lives within its walls, and to him is committed by the Council the superintendence of all resident Students under academical discipline. See page 23.

Some of the Professors, &c. receive Pupils into their houses. See p. 24.

The different Classes in this Department are likewise open to Gentlemen who, being unable to attend the whole course, may wish for the opportunity of studying any particular subject. The following are the Fees for admission to separate Courses:—

		Term. £ s. d.	Per Ann. £ s. d.
Classical Literature	Profes. Rev. R. W. Browne	4 4 0	10 10 0
Mathematics	Profes. Rev. T. G. Hall	4 4 0	10 10 0
Modern History	Profes. C. H. Pearson	2 2 0	5 5 0
English Language, Composition, &c.	Prof. Rev. J. S. Brewer	2 2 0	5 5 0
Hebrew	Profes. Rev. A. M'Caul, D.D.	2 2 0	5 5 0
French Language	Profes. Mariette	2 2 0	5 5 0
German Language	Profes. Bernays	2 2 0	5 5 0
Italian Language	Profes. Pistrucci	2 2 0	5 5 0
Spanish Language		2 2 0	5 5 0
Chinese Language	Profes. Summers	5 5 0	—
Drawing and Perspective	Professor De La Motte	2 2 0*	5 5 0*
		4 4 0†	10 10 0†
Library Fee		1 1 0	2 2 0

* For Matriculated Students. † For Occasional Students.

HOURS OF ATTENDANCE.

The duties of the day commence with prayers in the Chapel at Ten o'clock precisely, when the attendance of all Students is required.

	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Classics ..... } Mathematics ..... }	10½...1	10½...1	10½...1	10½...1	10½...1	—
Divinity	—	—	1½...2	—	—	10½...12½
English Language..	1½...3½	1½...3½	—	1½...3½	1½...3½	—
Modern History.....	1½...3½	1½...3½	—	1½...3½	1½...3½	—
French.....	3½...4½	—	—	3½...4½	—	—
German	—	3½...4½	—	—	3½...4½	—
Hebrew	—	—	3...4	3...4	—	—
Italian	9...10	—	—	9...10	—	—
Chinese.....	—	3½...5	3½...5	—	3½...5	—
Fencing	2...4	—	—	—	—	—
Landscape Drawing	8½...10	—	—	8½...10	—	—

KING'S COLLEGE, LONDON.

Department of General Literature and Science.

ORIENTAL SECTION.

The Council of King's College, London, have thought it desirable to extend the arrangements which up to this time have existed for Oriental instruction, in order to meet the wants of candidates for the Indian Civil Service, particularly those selected for "the further examination." The want of a regular system of instruction for such gentlemen has been urged upon the Council from various quarters.

This course will begin on Thursday, October 2, 1862, and will embrace the following subjects, viz.:—

Sanscrit and Bengali Hindu Law . . .	J. R. Ballantyne, Esq. LL.D. Professor, late Principal of the Government College, Benares.
Tamil. Telugu	Thomas Howley, Esq. Professor, late Head Master of the Anglo-Vernacular School, Ellore, Madras Presidency.
Arabic. . . . Mahomedan Law	G. W. Leitner, Esq. Professor, late First Class Interpreter to the British Commissariat in Turkey.
Hindustani . . . . . . History and Geography of India	Rev. S. Slater, A.K.C. Professor, late Senior Professor of Bishop's College, Calcutta.
English Law and Jurisprudence . . .	James Stephen, Esq. LL.D. Professor, of the Western Circuit, Recorder of Poole.
Political Economy	Rev. J. E. T. Rogers, M.A. Tooke Professor of Economic Science, King's College, London.
Jurisdiction and procedure of the Courts of Law in India.	

The mode of instruction adopted by the Professors will be a combination of lecturing with oral examinations; and they propose to examine the students both *vivâ voce* and by written papers at the end of every term.

At the end of the year there will be an examination, followed by a distribution of Certificates of Honour and Merit.

Gentlemen may be admitted, either as Matriculated Students of the College by entering to the following course:—

1. Any one or two of the Languages named in the list.
2. The History and Geography of India.
3. English Law and Jurisprudence.
4. Hindu Law.
5. Mahomedan Law.
6. Political Economy.
7. Procedure in Indian Courts of Law.

Or as occasional students, by joining any one or more classes, on payment of the specified fees.

If Matriculated Students wish to attend more than two language classes, they will be permitted to do so on payment of half the Fees payable for separate Classes.

The payment for Matriculated Students will be Twenty Guineas for each Term, payable at the beginning of the Term, or Fifty Guineas for the year, paid in one sum on entrance.

The fees for Matriculation are £5 15*s.* 6*d.*; or in the case of Graduates of any University, who will wear their own academical dress, £4 5*s.* 6*d.*

The fees for separate classes will be as follows:—

	TERM. £	*s.*	YEAR. £	*s.*
English Law and Jurisprudence	5	5	12	12
Sanscrit	5	5	12	12
Bengali	5	5	12	12
Hindu Law { taken with a language	2	2	5	5
Hindu Law { taken alone	3	3	8	8
Arabic	5	5	12	12
Mahomedan Law { taken with a language	2	2	5	5
Mahomedan Law { taken alone	3	3	8	8
Hindustani	5	5	12	12
History and Geography of India	2	2	5	5
Telugu	5	5	12	12
Tamil	5	5	12	12
Political Economy	3	3	8	8
Procedure in Indian Courts of Law	3	3	8	8
Library Fee	1	1	2	2

The following will be the hours of attendance:—

	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
Divinity	...	...	1.15—2	...	...
English Law	10.15—1	...	...	...	...
Indian Law Courts	...	12—1.30	...	...	...
Sanscrit	...	2.30—4	...	...	1.30—3
Bengali	1.30—3	...	2.30—4	...	...
Hindu Law	...	1.30—2.30	...	...	...
Arabic	3—5	...	...	3—5	...
Mahomedan Law	...	...	...	1.30—2.30	...
Hindustani	...	10.15—11.45	...	10.15—11.45	...
History and Geography of India	...	...	...	12—1	...
Telugu	...	...	10.15—11.45	...	10.15—11.45
Tamil	...	...	11.45—1.15	...	11.45—1.15
Political Economy	...	...	...	...	3.30—5

The regular course of instruction in this section will carry a student through three academical terms, viz. *Michaelmas Term*, from the beginning of October to the week before Christmas; *Lent Term*, from the middle of January to the week before Easter *Easter Term*, from Easter to the end of June.

Professor LEITNER has been appointed Dean of the Section for the ensuing year, and will be happy to give any gentleman such advice as he may need. Letters to the Professor may be addressed to King's College, London, or to 7, Belgrave Road, Abbey Road, N.W.

The valuable collection of Oriental books contained in the Marsden Library will be open, under certain regulations, for the use of Matriculated Students.

Further particulars may be obtained from J. W. CUNNINGHAM, Esq. Secretary, King's College, London.

N.B.—The next day fixed for the admission of new Students, is Thursday, October 2, 1862.

KING'S COLLEGE, LONDON.

Department of General Instruction in the Applied Sciences.

I.—ENGINEERING SECTION.

INCLUDING ENGINEERING, PRACTICAL SURVEYING AND LEVELLING, MANUFACTURING ART AND MACHINERY, &c.

The object of this Section is to provide a system of general instruction, essentially practical in its nature, for the large and important class of young men hereafter to be engaged in Civil and Military Engineering, Surveying, Architecture, and the higher branches of Manufacturing Art.

The whole course thus occupies three years, and forms an appropriate introduction to that kind of instruction which can only be obtained within the walls of the manufactory, or by actually taking part in the labours of the Surveyor, the Engineer, or the Architect.

Museums, containing important and valuable collections, illustrating the subjects taught, are open to the Students.

Students who have passed two years in this Department, and, in addition, not less than one year in practice under a Civil or Mechanical Engineer, are, by a special order of the Secretary of State for India in Council, admitted to be Candidates for appointments to the Engineer Establishment in India.

The course of instruction comprises those branches of knowledge which form the groundwork of a liberal education. The following are the subjects taught in this Section:—

RELIGIOUS INSTRUCTION,

According to the principles of the United Church of England and Ireland, by the Chaplain the Rev. E. H. Plumptre, M.A. late Fellow of Brasenose College, Oxford.

MATHEMATICS.

Professor—Rev. T. G. Hall, M.A.

Lecturers—Rev. T. A. Cock, M.A., and Rev. W. Howse, M.A.

First Year.—Arithmetic; Algebra; Euclid, Books 1, 2, 3, 4, 6, 11; Plane Trigonometry and Logarithms.

Second Year.—Conic Sections; application of Algebra to Geometry; the Differential and Integral Calculus.

Third Year.—Spherical Trigonometry; Geometry of three dimensions; Differential Calculus.

NATURAL PHILOSOPHY AND ASTRONOMY.

Professor—James Clerk Maxwell, Esq. M.A.

Lecturer—George Robarts Smalley, Esq. B.A.

The object of these Lectures is to teach the principal Mechanical Sciences—namely, Statics, Dynamics, Hydrostatics, Pneumatics, and Hydraulics, together with Optics and Astronomy.

The instruction given in the first year requires no mathematical knowledge on the part of the Student, the method of solving problems by Construction being adopted.

In the second and third years the Mathematical principles of Mechanics, Hydrostatics, Optics, and Astronomy are taught, including the Theory of Work, the Mathematical Calculations relating to Roofs, Arches, Chain Bridges, Embankments, Strength of Materials, &c. together with the Constructions and use of Optical and Astronomical Instruments.

CHEMISTRY.

Professor of Chemistry—W. A. Miller, M.D. F.R.S.

Professor of Practical Chemistry—C. L. Bloxam, Esq.

Demonstrator—E. A. Hadow, Esq.

Students of the First and Second Years are admitted to the Course of Theoretical and Applied Chemistry. The Course commences with a View of the Forces which concur

to the production of Chemical Phenomena, after which the laws of Chemical Affinity are discussed, and the Non-metallic Elements and their principal Compounds are described.

The Metals and their principal compounds are next examined, care being taken to point out the applications of the Science to the Arts, and the processes of the different Manufactures, of Metallurgy, and of Domestic Economy, are explained and illustrated.

Examinations of the Class, both *vivâ voce* and by written papers, are held at intervals during the course at the usual Lecture hour. Dr. Miller has published a work on Chemistry, which is used as a text-book by the Class.

Third Year.—Students who have completed six Terms in this Department are admitted to a Course of "Practical Chemistry," consisting of Twelve Demonstrations in each term; and they go through a course of Manipulation in the most important operations of Chemistry, including the first steps of Analysis.

Any Student of this Department may be admitted to this Class at any period of his study, on payment of an extra fee. See p. 12.

Experimental and Analytical Chemistry in the Laboratory.—The object of this Class is to afford to Students who are desirous of acquiring a knowledge of analysis, or of prosecuting original research, an opportunity of doing so under the superintendence of the Professor and Demonstrator; Students may enter, upon payment of the extra Fees, at any time except during the vacation, and for a period of one, three, six or nine months, as may best suit their convenience. The laboratory hours are from ten till four daily, except Saturday, on which day the hours are from ten till one.

In addition to the Laboratory Fee, each Student defrays the expenses of his own Experiments. The amount of this expense, which is comparatively trifling, is entirely under his own control.

GEOLOGY.

Professor—James Tennant, Esq. F.G.S.

Lent Term.—Descriptive Geology.

Easter Term.—The practical application of Geology to Engineering, Architecture, Agriculture, and Mining.

The Students are accompanied by the Professor to the Museum of Economic Geology, the British Museum, and other public institutions, and also on excursions into the country.

ARTS OF CONSTRUCTION IN CONNEXION WITH CIVIL ENGINEERING AND ARCHITECTURE.

Professor—Robert Kerr, Esq.

This Course, intended for Students of the second and third years, includes a descriptive account of the various Arts and Operations employed in Hydraulic Architecture or Engineering, and also of those employed in the ordinary practice of Civil Architecture;—Navigators', Bricklayers', Masons', Carpenters', Smiths' Work, &c.;—the matters acted upon,—the terms used,—the tools, implements, and materials employed, and the modes of operating with or upon them;—the combinations effected, and the modes of effecting them in detail:—Cutting and Embanking,—the Formation and Construction of Drains and Sewers, Shafts, Driftways, Tunnels, Canals, Reservoirs, Water Works, Roads, Bridges, Railways, Docks, Harbours, &c. &c.

The Course will also include Instruction in Specifying, Estimating, and Measuring Work, and in the practice of Architectural Surveying generally.

Any Student of this Department may be admitted to this class at any period of his study, on payment of the usual fee.

MANUFACTURING ART & MACHINERY.

Professor—C. P. B. Shelley, Esq.

The Lectures and Instructions in this section are intended to familiarize the student with the Machinery and contrivances in actual use; thus adding a knowledge of practice to the knowledge of theory taught by the Professors.

To effect this object, machines are not only described in general terms, but their various details, and the design of each particular construction, are explained and illustrated by drawings or models.

The most important manufacturing processes are also explained and amply illustrated in the course.

VISITS OF THE STUDENTS TO MANUFACTORIES, ETC.

Access to some of the principal Manufacturing Establishments in the metropolis, and its vicinity, having been liberally granted to the Students of this department of King's College, they are accustomed to visit them from time to time, accompanied by the Professor on Manufacturing Art and Machinery: they thus see in operation the manufacturing processes which have formed the subject of their Lectures, the mechanical expedients which concur to the production of each are explained, and the economy of the whole is pointed out on the spot

ENGINEERING WORKSHOPS.

SUPERINTENDENT—G. A. TIMME, ESQ.

Workshops have been fitted up. with engines, lathes, forges, benches, and all necessary implements for enabling the Students to become practically familiar with the Use of Tools, and the Construction of Models. At certain hours the Students are admitted. and a regular course of instruction is given, beginning with the simplest kinds of work and gradually proceeding to the construction of models of Apparatus and Machinery.

In addition to the Superintendent, experienced workmen are in attendance at regular hours.

GEOMETRICAL DRAWING AND DESCRIPTIVE GEOMETRY.

PROFESSOR—THOMAS BRADLEY, ESQ.

LECTURER—REV. JOSEPH H. EDGAR, M.A. LATE LIEUT. R.A.

This Course comprehends Practical Geometry in the most extensive sense of the term.

1. PLANE GEOMETRY, the delineation of plane figures and curves, and, generally, the solution of all the Problems required in the practical Arts; the use of Drawing Instruments, &c.

2. SOLID, or DESCRIPTIVE GEOMETRY, including PROJECTION, ISOMETRICAL PROJECTION, PERSPECTIVE. the construction of MAPS, LIGHT and SHADE, and DRAWING, in the common acceptation of the term, as connected with the objects of this Department.

LANDSCAPE DRAWING AND COLOURING, AS APPLIED TO ARCHITECTURAL DESIGNS.

PROFESSOR—PHILIP H. DE LA MOTTE, ESQ. F.S.A.

This Class is limited to Students of the third year, who have the option of attending it *instead* of Geometrical Drawing.

MINERALOGY.

PROFESSOR—JAMES TENNANT, ESQ. F.G.S.

The Course commences with a description of the Physical and Chemical characters of Minerals in general.

The principal simple Minerals are next separately considered, and the readiest mode of distinguishing them described.

The course of instruction includes a minute description of all the substances entering into the composition of Rocks, and of those minerals which are also used in the Arts; illustrated by an extensive collection of characteristic specimens, and diagrams of the principal crystalline forms, &c.

PRACTICAL SURVEYING AND LEVELLING.

LECTURER—HENRY JAMES CASTLE, ESQ.

This Course is at once theoretical and practical: in the College, it embraces the various in-door details of a Surveyor's Office; and in the field. the uses and application of the several Surveying Instruments which are now in use on *Civil and Military* Surveys in England, India, and the colonies. It also includes the Theory and Practice of Levelling, the making of Sections from the Field-Books, and all the requisite practical detail before getting out the working drawings and letting the contracts; and generally, such information, both theoretical and practical, as will qualify the Student to enter at once as Draughtsman into an Engineer's Office.

Any Student of this Department admitted to this Class out of his regular turn, must pay the usual extra fee.

THE ART AND SCIENTIFIC PRINCIPLES OF PHOTOGRAPHY.

LECTURER—GEORGE DAWSON, ESQ.

Arrangements are now made for a complete Course of Instruction in Photography to the students of the third year. A glass house, with commodious developing rooms, has been erected, and in connexion with it a Laboratory for the preparation of Photographic Chemicals. Students entering to this Department will be afforded every facility for practising the Art in all its branches.

In addition to the regular College Course in Photography, occasional Classes are formed, consisting each of about six gentlemen, who meet twice a week. Ten Lectures are given of two hours each, for which the fee is £3 3*s*., to be paid in the Office of the College. The fee for Private Instruction is £5 5*s*. for ten Lessons, or £10 10*s*. for three courses. There is in every case a charge of £1 each Course for Chemicals.

THE ADMISSION OF STUDENTS.

Previously to Matriculation, Students are required to produce a testimonial of good conduct from their last instructor, and to subscribe a declaration, that they will conform to all the Rules and Regulations of the College. Every Student, after obtaining the signature of the Principal to his card of admission, is required to bring it to Professor HALL, the Dean of this Department, in order that it may be countersigned by him.

CHAPEL.—All Matriculated Students are required to attend Prayers in the Chapel at 10 o'clock precisely. A register of their attendance is kept.

The Academical Year consists of *Three Terms;* viz. *Michaelmas Term*, from the beginning of October to the week before Christmas; *Lent Term*, from the middle of January to the week before Easter; *Easter Term*, from Easter to the beginning of July.

EXAMINATIONS.—One at the end of the Michaelmas Term and another at the close of the Academical Year, at which latter there is a public Distribution of Prizes.

AGE OF ADMISSION.—Except in special cases, no one is admitted under sixteen years of age.

RESIDENCE OF STUDENTS.—Rooms are provided within the walls of the College for the residence of a limited number of Matriculated Students. The Censor of the College lives within its walls, and to him is committed by the Council the superintendence of all resident Students under academical discipline. See page 23.

Some of the Professors, &c. receive Pupils into their houses. See page 24.

FEES.

The Fees payable by Matriculated Students, that is, by those who are admitted to the Regular and Prescribed Course of Study, amount to £12 17*s.* per Term. The Fees for the first two Terms must be paid upon entrance, in addition to the following:—

Matriculation Fees Library Cap and Gown Calendar	£5 15 6

The different Classes in this Department are open to any Gentlemen who may not wish to attend the whole of the Course, but who may desire to study any particular subject. The following are the Fees:—

	£	s.	d.		£	s.	d.	
Mathematics	4	4	0	per Term	10	10	0	per Annum.
Natural Philosophy	3	3	0	...ditto	8	8	0	ditto.
Chemistry	3	3	0	...ditto	7	7	0	for the Year.
Practical Chemistry	1	11	6*	for Terminal Course of 12 demonstrations.				
	2	2	0‖					
	4	4	0§	for Summer Course of 30 demonstrations.				
	5	5	0‖					
	8	8	0§	for perpetual attendance.				
	9	9	0‖					
Experimental and Analytical Chemistry	4	4	0	One Month.				
	10	10	0	Three Months.				
	18	18	0	Six months.				
	26	5	0	Nine Months.				
Descriptive Geology	2	12	6	for the Lent Term,	3	13	6	for the two Terms.
Practical Geology and Mining	1	11	6	for the Easter Term, or				
Arts of Construction, &c.	2	12	6	per Term	7	7	0	per Annum.
Landscape Drawing	2	2	0§	ditto	5	5	0§	ditto.
	4	4	0‖		10	10	0‖	
Mineralogy					2	2	0	for the Course.
Geometrical Drawing	2	2	0	per Term	5	5	0	per Annum.
Manufacturing Art and Machinery	2	2	0	.....ditto	5	5	0	ditto.
Practical Surveying	3	3	0	.....ditto	8	8	0	ditto.
Workshop†	3	3	0	.....ditto	8	8	0	ditto.
Photography‡	5	5	0	for Ten Lessons	10	10	0	for three courses.

* For Students of this Department who have not kept six Terms.
§ For Matriculated Students of other Departments ‖ For Occasional Students.
† A Fee of 1*l.s.* per Term is also required for the use of the Steam-engine and Machinery.
‡ A Fee of £1 each course for Chemicals is also required.

DAYS AND HOURS OF ATTENDANCE.

The duties of the day commence with prayers in the Chapel at Ten o'clock precisely, when the attendance of all Students is required.

	Monday.	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
FIRST YEAR.						
Chemistry	—	10.15—11.15	—	—	10.15—11.15	—
Mathematics	10.15—1	11.30—1	10.15—1	10.15—1	11.30—1	—
Mechanics and Nat. Phil.	10.15—1	—	10.15—1	10.15—1	—	—
Drawing	—	*a*1—4	—	—	1—4	—
Surveying	—	—	—	—	*e*3—4	*e*10
Mach. and Man. Art	—	—	—	1.15—2.15	—	—
Ditto, Visit	—	*b*1—4	—	—	—	—
Mineralogy (*c*)	—	—	9—10	—	9—10	—
Geology (*d*)	—	—	9—10	—	9—10	—
Practical Geology (*e*)	—	—	9—10	—	9—10	—
Workshop (*h*)	1—4	—	1—4	—	—	—
Divinity	—	—	—	2.30—3.15	—	11
SECOND YEAR.						
Chemistry	—	10.15—11.15	—	—	10.15—11.15	—
Mathematics	10.15—1	11.30—1	10.15—1	10.15—1	11.30—1	—
Mechanics	10.15—1	—	10.15—1	10.15—1	—	—
Drawing	1—4	*a*1—4	—	—	—	—
Surveying	—	—	—	—	*f*4—5	*g*10
Mach. and Man. Art. (*o*)	—	—	1.15—2.15	—	—	—
Ditto, Visit	—	*b*1—4	—	—	—	—
Mineralogy (*c*)	—	—	9—10	—	9—10	—
Geology (*d*)	—	—	9—10	—	9—10	—
Practical Geology (*e*)	—	—	9—10	—	9—10	—
Arts of Construction (*m*)	—	—	4—5	3.30—4.30	—	—
Workshop (*h*)	—	—	1—4	—	1—4	*g* 10.15—1
Divinity	—	—	—	2.30—3.15	—	11
THIRD YEAR. *Extra Subjects.*						
Practical Chemistry (*i n*)	10.30—12.30	—	—	—	—	—
Photography (*k n*)	—	—	—	—	10.30—12.30	—
Surveying	—	—	—	—	*j*3—4	*p*10

As to other Classes, similar in all respects to Second Year Students.

a b. Alternate Wednesdays.
c. Michaelmas Term only.
d. Lent Term only.
e. Easter Term only.
f. Michaelmas and Lent Terms only.
g. On alternate Saturdays in Surveying during the Michaelmas and Lent Terms only.
h. Open from 1 to 6 daily (Saturday excepted, when it closes at 4), for such Students as have leisure for attending; but attendance required, and marked, at the hours named.
i. Twelve Lessons every Term.
k. Six Lessons every Term.
m. Open to Students of the First Year on payment of the usual fee.
n. Open to Students of the Second Year on payment of the usual fee, and by leave of the Dean.
o. Students not attending this Class on Tuesday, are to attend the Workshop from 1 to 4, and must also attend the lecture on machinery, at 1.15. on Thursday.
p. On alternate Saturdays in Levelling during the Michaelmas and Lent Terms only.

ENDOWMENTS, PRIZES, &c.

SCHOLARSHIPS.—One of £30, two of £25, and one of £20, tenable for one year.
The Divinity Scholarship of £30.
The Daniell Scholarship of £20. (See page 20.)

PRIZES, Certificates of Approval, and Certificates of Honour, are given to those Students who most distinguish themselves at the Examinations held in June.

ASSOCIATES, &c.—Students who have pursued their Studies in this Department for Nine Terms, and who have fulfilled the conditions mentioned in the Calendar, are entitled to the Diploma of "Associate of King's College."

MILITARY SECTION.

This Section of the Applied Sciences Department is intended—

A. For those Gentlemen intending, (1) to compete in the Examinations for admission into the Royal Military Academy at Woolwich; the Royal Military College at Addiscombe; or the Royal Military College at Sandhurst: (2) or to pass the Examination for Commissions in the Service of Her Majesty, either in England or in the East Indies.

B. For Officers wishing to prepare themselves for the Examination for Staff Appointments, or to compete for admission into the Royal Military College at Sandhurst.

The different Classes are conducted by the following Professors and Lecturers:—

Religious Instruction, according to the principles of the United Church of England and Ireland, by the Rev. E. H. Plumptre, M.A. Chaplain.

Mathematics, by the Rev. T. G. Hall, M.A. Professor, the Rev. T. A. Cock, M.A. Lecturer, and the Rev. W. Howse, M.A. Assistant Lecturer.

Chemistry, by Professor W. A. Miller, M.D. Professor.

Natural Philosophy, by J. C. Maxwell, Esq. M.A. Professor, G. R. Smalley, Esq. B.A. Lecturer.

Mineralogy and Geology, by James Tennant, Esq. Professor.

Geometrical Drawing, by Rev. Joseph H. Edgar, M.A. late Lieut. R.A. Lecturer.

Topographical Drawing; Fortification; Military Surveying; Military Law; the Science of Artillery, by Major Griffiths, R.A. Professor.

French, by Professor Mariette, M.A. Professor, and M. Stievenard, Lecturer.

Military Tutor (for History, Classics, &c.), Rev. J. O'Reilly, M.A.

FEES AND HOURS OF ATTENDANCE.

Fees to Separate Classes per Term.		Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
£ s							
	Divinity	...	...	...	2.30—3.15	...	...
2 2	Mineralogy and Geology.	...	...	9—10	...	9—10	...
3 3	Chemistry	...	10.15—11.15	...	...	10.15—11.15	...
3 3	Heat and Electricity (Natural Philosophy)	10.15—1	...	10.15—1	10.15—1	...	...
4 4	Mathematics.... Pure / Mixed	10.15—1	11.30—1	10.15—1	10.15—1	11.30—1	...
2 2	Geometrical Drawing	1—3	1—3	...	...	1.15—4	...
4 4	Topographical Drawing, Fortification, &c.	...	...	1.15—3.15	...	...	10.15—12.30
8 8	Ditto, for Officers only	...	...	11—3.15	...	...	10.15—2.30
2 2	French	3.15—4.45	...	...	1.15—4.[illegible]	...	...
4 4	Military Tutor's Class in History, Classics, &c.	...	3—4.45	...	1.15—2.15	2.30—4.30	...

Fees per Term to Matriculated Students, for the Course, including Tutor's Class, 15*l.* 15*s.* The Matriculation Fees are 5*l.* 15*s.* 6*d.* on entrance.

Fees for Officers' Class, 8*l.* 8*s.* per Term.

For further particulars apply to Major Griffiths.

KING'S COLLEGE, LONDON.

Medical Department.

The Students received into this Department are—

I. Matriculated Students, or those who (with certain exceptions named in the Calendar) receive their entire medical education at King's College.

Matriculated Students alone have the privilege of filling the offices of Clinical Clerks, Dressers, Dentist's Assistant, House Physician, Physician Accoucheur's Assistant, Assistant House Physician, House Surgeon, and Assistant House Surgeon, to the Hospital; of becoming candidates for the Warneford and Medical Scholarships; and of wearing the College cap and gown. They are also admitted to the practice of the Hospital at a reduced fee.

II. Occasional Students, or those who enter to one or more particular Classes. Every Class is open to such Students, on payment of the prescribed amount of fees.

The year is divided into two Sessions. The Winter Session, beginning October 1st, terminates at the end of March. The Summer Session, beginning May 1, terminates at the end of July.

The Lectures upon the various branches of Medical Knowledge are as follows:—

Winter Session.

ANATOMY, DESCRIPTIVE AND SURGICAL.	*Professor*, Rich. Partridge, F.R.S. *Demonstrator*, J. Wood, F.R.C.S. *Assistant Demonstrators*, J. Sherwin. E. Bellamy. T. M. Cann. H. R. Bell.
PHYSIOLOGY: GENERAL AND MORBID ANATOMY	*Professor*, Lionel Smith Beale, M.B.F.R.S.
CHEMISTRY	*Professor*, W. A. Miller, M.D. LL.D. F.R.S. *Demonstrator*, E. A. Hadow, Esq.
MEDICINE, PRINCIPLES AND PRACTICE OF	*Professor*, George Johnson, M.D.
SURGERY, PRINCIPLES AND PRACTICE OF	*Professor*, William Fergusson, F.R.S.

Summer Session.

BOTANY	*Professor*, Robert Bentley, F.L.S.
MATERIA MEDICA AND THERAPEUTICS	*Professor*,
MIDWIFERY, AND THE DISEASES OF WOMEN AND CHILDREN	*Professor*, Arthur Farre, M.D. F.R.S.
FORENSIC MEDICINE	*Professor*, W. A. Guy, M.B. F.S.S.
PRACTICAL CHEMISTRY	*Professor*, C. L. Bloxam.
COMPARATIVE ANATOMY	*Professor*, T. Rymer Jones, F.R.S.
DENTAL SURGERY	*Professor*, Samuel Cartwright, jun. F.R.C.S.

Dean for the Year 1862-63 . . . . . PROFESSOR MILLER, M.D.

Sub-Dean and Medical Tutor . . . . . JOHN HARLEY, M.D.

It is one of the duties of the Medical Tutor to assist by instruction and examination the Students living in the College, as well as the non-resident Students, in the subjects of the Lectures of their first Winter and Summer Session.

N.B. By a recent regulation all candidates for *the Diploma of the College of Surgeons*, who shall commence their *Professional* Education on or after the 1st of January, 1861, will be required to pass a preliminary examination in the ordinary branches of a liberal education, or to produce certificates from certain specified institutions of

having passed a corresponding examination. For particulars see the Regulations of the Royal College of Surgeons, quoted in the Calendar.

Students who intend to graduate in the University of London are reminded that they will be required to pass the Matriculation Examination of that University at least two years before they can present themselves as candidates for any of its degrees. A certificate of having passed this examination, is admitted by the College of Surgeons and the Apothecaries Hall as a substitute for their own preliminary examinations.

A certificate of attendance on a course of Comparative Anatomy is required from candidates for examination by the Universities of London and Edinburgh, and by the Army and Navy Medical Boards.

ANALYTICAL AND EXPERIMENTAL CHEMISTRY.

Besides the Course of Chemical Lectures, and the Summer Class of Practical Chemistry, provision is made for those Students who wish to become more minutely acquainted with the practical details of the science. The Class formed for this purpose is conducted in the Laboratory, under the superintendence of the Professors and Demonstrator. By this means each Student will be enabled to familiarize himself with the methods of analysis and research. After passing through a preliminary course of analytical operations, each Student devotes himself to such portions of the science as are most interesting to himself, or most likely to be practically useful to him.

DENTAL SURGERY.

A Course of Lectures on Dental Physiology, Dental Surgery, and Pathology, and on Dental Mechanics, will be given during the Summer Session for those who specially enter for this Course.

Special Certificates of attendance on the Dental Practice of the Hospital will be given on payment of an extra Fee of Five Guineas.

Fees.

The College fees, in the case of *Matriculated* Students, for the lectures required by the College of Surgeons and the Society of Apothecaries, amount to 61*l.* 19*s.*; those for Hospital practice to 31*l.* 10*s.*; those for Matriculation, (including Library Fee, Calendar, and College Cap and Gown,) to 5*l.* 15*s.* 6*d.*; making together 99*l.* 4*s.* 6*d.* This sum will cover all that of necessity *must* be paid for the entire three years' Course of Study.

Students are, however, recommended to add to this sum 2*l.* 2*s.* for a second Course of Chemistry, as well as the Fee for attendance on the Medical Tutor's Class for one year; viz. 3*l.* 3*s.* All *resident* Students are *required* to attend the Tutor during their first year.

The fees may be paid either in one sum on Matriculation, or in two equal sums; the one at the commencement of the first Winter or Summer Session, the other, after the first Christmas vacation, not later than Jan. 21st, unless special arrangements are made at the time of entrance.

If the plan here suggested be carried out, the following will be the mode of payment.

In October.	First half of the Medical Fees	£32	0	6		
,,	First Half of the Hospital Fees	15	15	0		
,,	Medical Tutor, One Year	3	3	0		
,,	Matriculation Fees	5	15	6		
					56	14 0
In January.	Second half of Medical Fees	32	0	6		
,,	Second half of Hospital Fees	15	15	0		
					47	15 6
Total amount necessary to defray the cost of Lectures required by the College of Surgeons and the Society of Apothecaries, together with a Second Course of Chemistry and the Tutor's Fees for One Year					£104	9 6

Should any one prefer entering at once as a *perpetual Student to every Course of Instruction* given in this Department (except the Laboratories and Dental Surgery) the charge will be as follows:—

In October.	First half of Medical Fees	£38	6	6		
,,	First half of Hospital Fees	15	15	0		
,,	Medical Tutor, One Year	3	3	0		
,,	Matriculation	5	15	6		
					63	0 0
In January.	Second half of Medical Fees	38	6	6		
,,	Second half of Hospital Fees	15	15	0		
					54	1 6
Total amount necessary to defray the cost of entering, as a *Perpetual* Student, to every Course of Instruction given in this Department, except as above.					£117	1 6

The Fees for admission to the Laboratory Class, exclusive of materials, are, for one month, 4*l.* 4*s.*; for three months, 10*l.* 10*s.*; for six months, 18*l.* 18*s.* &c.

Days and Hours of Attendance.

CLASS.	M.	Tu.	W.	Th	F.	S.	HOURS.	Fee for the Annual Course.	Fee for Unlimited Attendance.
WINTER SESSION.									
Anatomy	—	—	—	—	—	*—	9 — 10 a.m.	£6 6 0	£9 9 0
Chemistry	—		—	—		—	10½—11½ a.m.	7 7 0	9 9 0
Physiology	—		—	—	—		4 — 5	6 6 0	9 9 0
Medicine		—		—		—	4 — 5 5 — 6	7 7 0	7 7 0
Surgery	—		—		—		5 — 6	5 5 0	7 7 0
The Chaplain's Lecture					—		10½— 11 a.m.		
†Tutor's Class	—	—	—	—	—	—	5 — 6	3 3 0	
SUMMER SESSION.									
Midwifery	—		—	—	—		9 — 10 a.m.	6 6 0	6 6 0
Comparative Anatomy	—		—		—		12 — 1	3 3 0	4 4 0
Botany	—	—		—	—		12½— 1½	3 3 0	4 4 0
†Practical Chemistry	—	—	—	—	—	—	10½— 12 a.m.	‡4 4 0	‡3 8 0
Forensic Medicine	—	—	—		—		3 — 4	3 3 0	4 4 0
Materia Medica	—		—	—	—		8 — 9 a.m.	4 4 0	6 6 0
Morbid Anatomy		—					4 — 5	2 2 0	
Dental Surgery		—			—		9 — 10 a.m.	6 6 0	8 8 0
†Tutor's Class	—	—	—	—	—		9 — 10 a.m.	3 3 0	
BOTH SESSIONS.									
Chapel	—	—	—	—	—	—	10 a.m.		
The Principal's Lecture			—		—		1½— 2		

* Anatomy of the head and Neck. See Reg. of Coll. of Surg. for Dent. Surg.
† Half the Class attends three days alternately. ‡ To Matriculated Students.

King's College Hospital.

Consulting Physicians. Thos. Watson, M.D. F.R.S. — Robert Ferguson, M.D.

Physicians.
- George Budd, M.D. F.R.S. — With care of In-Patients.
- George Johnson, M.D. — With care of In-Patients.
- Lionel S. Beale, M.B. F.R.S. — With care of In-Patients.
- W. A. Guy, M.B. F.S.S. — With care of Out-Patients.
- Arthur Farre, M.D. F.R.S. — For Diseases of Women and Children, and Physician-Accoucheur.

Assistant-Physicians
- Conway Evans, M.D.; Alfred B. Duffin, M.D.; F. Symes Thompson, M.D.; E. Liveing, M.D. — With care of Out-Patients.
- Thomas H. Tanner, M.D.; Alfred Meadows, M.D. — For diseases of Women and Children.

Surgeons. W. Fergusson, F.R.S.; Richd. Partridge, F.R.S. — With care of In-patients.

Assistant-Surgeons. John Wood, F.R.C.S.; Henry Smith, F.R.C.S.; F. Mason, M.R.C.S.; W. S. Watson, M.R.C.S. — With care of Out-patients.

Surgeon-Dentist. S. Cartwright, jun. F.R.C.S.

The Resident Medical Officers, Clinical Clerks, Dressers, &c. are selected by *examination* from among those *Matriculated* Students of the College who are Pupils of the Hospital. No Fee is paid for any of these appointments.

DAYS AND HOURS OF ATTENDANCE.

	M.	Tu.	W.	Th.	F.	S.	HOURS.	CLINICAL LECTURE.
Dr. Budd	—		—		—		1½ p.m.	Every alt. Monday at 1½ p.m.
Dr. Johnson		—		—		—	1½ p.m.	Every alt. Tuesday at 1½ p.m.
Dr. Beale		—		—		—	9 a.m.	Every Saturday at 9 a.m.
Dr. Arthur Farre		—		—		—	12½ p.m.	
Dr. Guy	—		—		—		1 p.m.	
Dr. Evans (Winter Sess. only)	—		—		—		1 p.m.	
Dr. Duffin	—		—		—		1 p.m.	
Dr. Thompson		—		—		—	1 p.m.	
Dr. Liveing		—		—		—	1 p.m.	
Dr. Tanner (Winter Sess. only)		—		—		—	12½ p.m.	
Dr. Meadows (Sum. Sess. only)		—		—		—	12½ p.m.	
Professor Fergusson		—		—		—	1½ p.m.	Every alt. Thursday at 1½ p.m.
Professor Partridge	—		—		—		1½ p.m.	Every alt. Friday at 1½ p.m.
Mr. Smith	—		—		—		1 p.m.	
Mr. Mason	—		—		—		1 p.m.	
Mr. Watson		—		—		—	1 p.m.	
Mr. Wood (Sum. Sess. only)		—		—		—	1 p.m.	
Mr. Cartwright		—			—		10 a.m.	
Vaccination	—						10 a.m.	

FEES.

Perpetual Admission to the Medical and Surgical Practice:—

For Matriculated Students £31 10 0
For those not Matriculated 36 15 0

Medical Practice:—		*Surgical Practice:—*	
Three Months	6 6 0	Three Months	10 10 0
Six Months	10 10 0	Six Months	15 15 0
Eighteen Months	15 15 0	Twelve or Twenty-one Months	21 0 0
Perpetual	21 0 0	Perpetual	26 5 0

Scholarships.

A. WARNEFORD SCHOLARSHIPS.—The sum of 200*l.* is set apart annually, n consideration of 5,000*l.* presented to the College by the late Rev. S. W. Warneford, LL.D., for Scholarships to Matriculated Students of this Department, viz.—

Class I.—"For the encouragement of the previous education of Medical Students." Two Scholarships of 25*l.* per annum, for three years.

Class II.—"For the encouragement of resident Medical Students." One Scholarship of 25*l.* per annum for two years.

B. COLLEGE SCHOLARSHIPS.—The following are given every year to Matriculated Students of this Department:—

1. One of 40*l.* for two years, open to Students of the third and fourth year.
2. One of 30*l.* for one year, open to Students of the second year.
3. Three of 20*l.* for one year, open to Students of the first year.

C. DANIELL SCHOLARSHIP.—This Scholarship was founded in honour of the late Professor Daniell, and is open to every Student of the College, whether matriculated or occasional, who has worked in the Laboratory for at least six months. It is of the annual value of 20*l.*, tenable for two years.

D. DIVINITY SCHOLARSHIP.—This Scholarship of 30*l.* is also open to Matriculated Students of this Department.

Prizes.

A. LEATHES' PRIZES.—The Interest of 300*l.* bequeathed by the late P. H. Leathes, Esq., is applied in the purchase of a Bible and Prayer-book, as Annual Prizes to two Matriculated Medical Students.

B. WARNEFORD PRIZES.—The sum of 40*l.* is set apart annually in consideration of 1,000*l.* presented to the College by the late Rev. S. W. Warneford, LL.D., and is expended in the purchase of Medals and Books, as Prizes to two Matriculated Medical Students.

C. CLASS PRIZES are awarded annually for proficiency in the several subjects of Anatomy, Physiology, Chemistry, Materia Medica, Surgery, Medicine, Midwifery, Botany, Forensic Medicine, Comparative Anatomy, and Practical Chemistry. These consist of Books of the value of 3*l.*

Certificates of Honour are given to such Students in each class as the respective Professors shall consider entitled to receive them.

Two Medical Clinical Prizes, one of 3*l.* for the Winter Session, and the other of 2*l.* for the Summer Session; and two Surgical Clinical Prizes of the same value, are given also for the encouragement of diligence in attendance at the Hospital.

All Students, *Occasional* as well as *Matriculated*, will be admitted to contend for the Class Prizes C, under rules laid down as to the number of Courses of Lectures. For particulars of all these Prizes see Calendar.

ASSOCIATES OF KING'S COLLEGE.—At the end of each Winter Session, the Professors lay before the Council the names of those Medical Students whom they recommend to be elected Associates of King's College, London. See the College Calendar. Application, stating qualifications, to be made to the Sub-Dean of the Medical Department, in writing, previous to the 31st of March in each year.

DEGREES.—Students of this College are admitted to Degrees in Arts and Medicine, and for the Honours, Exhibitions, and Scholarships conferred by the Senate of the University of London.

By a regulation of the University of Edinburgh, three out of the four years of study required by that University for its degree of M.D. may be passed at King's College.

RESIDENCE OF STUDENTS.—Rooms are provided within the walls of the College for the residence of a limited number of Matriculated Students. See page 22.

Some of the Professors, &c. receive Pupils into their houses. The Council have also sanctioned a limited number of Medical Gentlemen, residing in London or its immediate neighbourhood, to receive Pupils into their houses. See page 24.

The Parents or Guardians of Students are earnestly requested to communicate with the Dean of the Medical Department before fixing their place of residence.

DINING HALL.—There is a Dining Hall in the College, for the accommodation of the resident Students, and for such other Students as may desire to avail themselves of it.

The Sub-Dean of the Medical Department attends daily at King's College, London, from 10 A.M. to 12, for the purpose of seeing Students and their friends. Any letter addressed to him on the subject of this Department, will receive early attention.

RULES
FOR THE
WARNEFORD SCHOLARSHIPS.

THE Council hereby give notice, that the following will be the Rules under which Scholars on these Foundations will be elected—

CLASS I.
FOR THE
Encouragement of the previous Education of Medical Students.

TWO SCHOLARSHIPS, of the value of £25 per annum each, to be held for three years, and THREE SCHOLARSHIPS, of the value of £25 per annum each, to be held for two years, will be given in October, 1862, subject to the provisions hereafter stated.

Candidates must be Matriculated Students of the Medical Department, and also perpetual Pupils of the Hospital.

Their first Winter Session must commence in October, 1862.

The Examination will be in the following subjects :—

1. DIVINITY.—The Book of Exodus. The Gospel according to St. John, in Greek. The Church Catechism, with Scripture proofs.

THE GREEK AND LATIN CLASSICS.—Homer Il. Book IX.; Livy, Book V.

3. ENGLISH LANGUAGE AND HISTORY.—Bunyan's Pilgrim's Progress. The reign of Charles II.

4. MATHEMATICS.—Arithmetic; Algebra, as far as and including Quadratic Equations; Euclid, Book I.; Book II. except Props. 8, 9, 10; Book III.

5. THE MODERN LANGUAGES.—French: Histoire des Protestants de France, par De Félice. German: Grosz-Hoffinger's Erzherzog Karl Von Oesterreich.

An equal number of marks is assigned to each of the five subjects. A want of sufficient knowledge in Divinity absolutely disqualifies from further examination; but candidates may omit any other subjects which they think proper.

These Scholarships may be held for three or for two years respectively, provided the Scholar continues so long attending Lectures in the Medical Department at King's College, and provided he shall produce to the Council, at the close of his First and Second Academical Year respectively, a Certificate signed by the Principal, the Chaplain, and the Dean of the Medical Department, (1) of good conduct; (2) of regular attendance on the daily Chapel Service, and (3) the Divinity Lectures; and (4) of satisfactory progress in his Religious and Medical studies during the year then past. The Scholarship will become void at the close of the Academical Year in which such Certificate is not obtained.

For further particulars respecting the Examination, &c. for these Scholarships, see the King's College Calendar.

The days of Examination for 1862 are fixed as follows:—

Monday, September 29 :—

10 to 3. DIVINITY. { 1½ hour to each of the three subjects, with short intermissions.

Tuesday, September 30 :—

9 to 11. LATIN.
11½ to 1½ GREEK.
3 to 5. FRENCH.

Wednesday, October 1 :—

9 to 2. MATHEMATICS. { 1½ hour to each of the three subjects with short intermissions.

Thursday, October 2 :—

9 to 11. HISTORY.
11½ to 1½. ENGLISH LITERATURE.
3 to 5. GERMAN.

CLASS II.

FOR THE

Encouragement of Resident Medical Students.

ONE SCHOLARSHIP will be awarded at the close of the month of July, 1861, of the value of £25 per annum, to be held for two years, subject to the provisions hereafter stated.

This Scholarship is open to all *Second Year* Matriculated Students of the Medical Department, being also perpetual Pupils of the Hospital, who during

At least Six Months of their First Academical Year,
and the
Whole of their Second Academical Year,
} have

resided within the limits of the College, and who produce to the Principal the following certificates; viz. (1) of good conduct from the Censor, or from the Physician or Surgeon with whom he has been residing; (2) of regular attendance on the Sunday and daily Chapel Service, and (3) on the Divinity Lectures, from the Chaplain; and (4) of satisfactory attention to the regular Medical studies, from the Dean of the Department.

The Examination for 1862 will be in the following subjects:—

I. Divinity:—

1. The Book of Deuteronomy.
2. The First Epistle of St. Peter.
3. Butler's Analogy, Part II. Ch. i.—v.
4. The Thirty-Nine Articles, Art. i. ii. iii.

II. Candidates will be required, at the time of examination,

1. To write from memory the particulars of four cases which shall have been treated in the Hospital during the previous Academical Year. Each Candidate may select his own cases; but no two cases selected by him may be taken from the practice of the same Physician or Surgeon.
2. To give, in writing, with the aid of notes taken by himself at the time, the substance of four of the Clinical Lectures which shall have been delivered in the Hospital by the Medical Officers thereof during the previous Academical Year. The Lectures to be selected by the Examiners.
3. To answer, either *vivâ voce*, or in writing, as the Examiners may direct, four questions on cases which shall have occurred or been treated within the Hospital in the practice of the Physicians and Surgeons thereof, in the current Session.

N.B. Candidates who have been holding Hospital Appointments in the year preceding the Examination, have the liberty of stating, at the time they give in their names, which of the two Physicians and which of the two Surgeons they have had the opportunity of attending, and they will be examined only in the Clinical Lectures and Clinical Teaching given by such Physician and Surgeon.

An equal number of marks is assigned to each of the two great divisions of the Examination; viz. Divinity and Hospital Practice; but a want of sufficient knowledge in Divinity absolutely disqualifies from further examination.

These Scholarships are tenable only so long as the Scholar continues to attend Lectures in the Medical Department, and to reside within the limits of the College; unless, previously to the expiration of the two years for which the Scholarship is tenable, the Scholar have passed the necessary examinations required by the College of Surgeons and the Society of Apothecaries, or have been excused from further residence by the Council of King's College, for any cause that may to them seem reasonable: provided also that, at the close of his Third Academical Year, each Scholar on this Foundation shall produce to the Council a certificate, signed by the Principal, the Chaplain, and the Censor of the College, and by the Dean of the Medical Department, (1) of good conduct; (2) of regular attendance on the Sunday and daily Chapel Service, and (3) on the Divinity Lectures; and (4) of satisfactory progress in his Religious and Medical studies during the year then past. Unless such Certificate is produced, the Scholarship will become void at the close of that Academical Year.

Residence of Students.

Rooms are provided within the walls of the College, for the residence of a limited number of Matriculated Students.

The Censor of the College, the Rev. C. H. O. Daniel, M.A., Scholar of Worcester College, Oxford, lives within its walls, and to him is committed by the Council the superintendence of all resident Students.

TERMS AND RULES AS TO PAYMENT.

		Academical Year.	Winter Session.	Summer Session.	Single Term.
		£	£ s. d.	£ s. d.	£
No. 1.	Sitting-room and Bed-room separate	60	45 0 0	20 0 0	22
2.	Ditto ditto ditto	55	41 5 0	18 6 8	20
3.	Ditto ditto in one.....	50	37 10 0	16 13 4	18
4.	Ditto ditto ditto	50	37 10 0	16 13 4	18
5.	Ditto ditto separate.....	60	45 0 0	20 0 0	22
6.	Ditto ditto ditto	60	45 0 0	20 0 0	22
7.	Ditto ditto in one.....	50	37 10 0	16 13 4	18
8.	Ditto ditto ditto	50	37 10 0	16 13 4	18
9.	Ditto ditto separate.....	60	45 0 0	20 0 0	22
10.	Ditto ditto ditto	60	45 0 0	20 0 0	22
11.	Ditto ditto in one.....	50	37 10 0	16 13 4	18
12.	Ditto ditto ditto	50	37 10 0	16 13 4	18
13.	Ditto ditto separate.....	55	41 5 0	18 6 8	20
14.	Ditto ditto ditto	60	45 0 0	20 0 0	22
18.	Ditto ditto in one.....	50	37 10 0	16 13 4	18
19.	Ditto ditto separate.....	60	45 0 0	20 0 0	22
20.	Ditto ditto ditto	55	41 5 0	18 6 8	20
21.	Ditto ditto ditto	50	37 10 0	16 13 4	18
22.	Ditto ditto ditto	60	45 0 0	20 0 0	22
23.	Ditto ditto ditto	60	45 0 0	20 0 0	22
24.	Ditto ditto ditto	55	41 5 0	18 6 8	20
25.	Ditto ditto ditto	50	37 10 0	16 13 4	18
26.	Ditto ditto ditto	60	45 0 0	20 0 0	22
27.	Ditto ditto ditto	60	45 0 0	20 0 0	22
28.	Ditto ditto ditto	55	41 5 0	18 6 8	20
29.	Ditto ditto ditto	50	37 10 0	16 13 4	18

In these amounts are included the *whole* expenses of Rent for Furnished Rooms, Attendance during the Academical Year, Coals during the Michaelmas and Lent terms or the Winter Session, and of Dinner in the College Hall during the time that Lectures continue.

Students have to bring their own linen, and to find their own cups and saucers, &c. for their rooms. These articles, however, as well as bread, butter, tea, sugar, &c. for breakfast, can be obtained through the Manciple of the College, at fixed prices.

All Students, not belonging to the Medical Department, must take rooms for at least two terms upon first coming to reside. Medical Students taking rooms in October, must engage them for the whole Winter Session. The amount may be paid in full upon entrance; or one-half upon entrance, and the remainder at the beginning of the second division of the Session, and not later than January 21. A Student will not be allowed the benefit of the reduction made to those who take rooms for the whole year, unless he declares this to be his intention upon entrance. In this case he will be required to pay *the whole of the Fees for the year* upon entrance, or in two portions, as before mentioned.

Three months' notice is to be given of the intention of any Student to give up his rooms.

In the event of any vacancy occurring, Students will have the preference of changing their rooms according to length of residence in College. Three days' notice will be given in the College Hall of vacancies as they occur.

All fees are payable in advance.

RULES FOR THE GUIDANCE OF RESIDENT STUDENTS.

Quiet, order, decorum, and peaceful conduct must be strictly observed.

Each Student is required to be at home by Ten o'Clock at night, unless absent by leave of the Censor.

No person can be allowed to enter the College for the purpose of visiting a Student after Ten o'Clock.

Friends visiting Students are required to leave the College before Eleven o'Clock. In case of this rule being under any circumstances infringed, the Student must accompany his friends to the gate, and enter his own and their names, together with their address, in a book kept for the purpose by the Porter. Each Student is held responsible for the orderly and quiet conduct of all friends while leaving his rooms, as well as during their visit there.

Resident Students must dine in the College Hall (in their academical dress) every day, except when absent by leave of the Censor.

Names of Gentlemen authorized by the Council to receive Medical Students into their houses as Boarders, under rules laid down by the Council for their guidance.

John Wood, Esq. Demonstrator of Anatomy, 4, Montague Street, Russell Square.
W. B. Gill, Esq. M.D. 5, Cambridge Place, Albany Street.
C. Holthouse, Esq. 9, New Burlington Street.
H. Hyde Salter, Esq. M.D. 6, Montague Street, Russell Square.

Names of Gentlemen authorized by the Council to receive General Literature, Applied Sciences, Military, and Civil Service Students into their houses as Boarders.

Rev. T. A. Cock, M.A. 18, Rodney Street, Pentonville, Lecturer in Mathematics.
H. J. Castle, Esq. 21, Euston Square, Lecturer in Surveying.
J. Summers. Esq. Professor of Chinese, Northaw, Barnet.
Rev. A. S. Thelwall, 43, Torrington Square, Lecturer in Public Reading.
Rev. J. O'Reilly, 35, Westbourne Park Villas, Lecturer in Military Science.
C. Tomlinson, Esq. 12, Bedford Place, Hampstead Road, Lecturer on Science.
Rev. J. J. Heywood, 22, Bedford Place, Russell Square, Lecturer in Classical Literature.
G. R. Smalley, Esq. 22, Victoria Road, Old Charlton, Lecturer in Natural Philosophy.
G. W. Leitner, Esq. 7, Belgrave Road, Abbey Road, N.W., Professor of Arabic.

KING'S COLLEGE,

LONDON.

Evening Classes.

1. Classes for Evening Instruction are held at King's College during the months from October to March, inclusive, and during the months of April, May, and June.

2. The Winter Course for 1862-3 will commence on Monday, October 13, and will terminate on Friday, March 27, the last fortnight being devoted to examinations.

There will be a Vacation of four weeks at Christmas, commencing from after Friday, December 19, 1862.

The Second Half of the Winter Session will begin on Monday, January 19, 1863.

The Summer Course for 1863 will commence on Monday, April 13, and will continue till the end of June.

3. The following are the subjects of the Winter Course :—

1. DIVINITY.
2. LATIN. (Four Classes.)
3. GREEK. (Four Classes.)
4. FRENCH. (Six Classes.)
5. GERMAN. (Four Classes.)
6. ITALIAN. (Two Classes.)
7. ENGLISH LANGUAGE AND COMPOSITION. (Four Classes.)
8. ANGLO-SAXON.
9. HISTORY } OF ENGLAND.
10. GEOGRAPHY }
11. ARITHMETIC AND BOOK-KEEPING.
12. WRITING (official and ordinary.)
13. MATHEMATICS (including Algebra, Euclid, Trigonometry, Differential and Integral Calculus). (Six Classes.)
14. THE PRINCIPLES OF COMMERCE AND COMMERCIAL LAW.
15. DRAWING. (Landscape, Figure, Model, and Architectural.)
16. THE ELEMENTS OF CHEMISTRY.
17. MECHANICS.
18. PHYSIOLOGY.
19. BOTANY.
20. EXPERIMENTAL PHYSICS.
21. SPANISH.
22. DUTCH.
23. ZOOLOGY.

Many of these Classes have special reference to the B.A. and Matriculation Examinations at the University of London.

If any number of Gentlemen, not less than Ten, shall wish for instruction in

any other subject, such as Hebrew, Mineralogy, &c. arrangements will be made (if possible) to meet their wishes.

4. The following are the Fees for the Winter Session:—

(1.) For any single Course (except Divinity), £1 11*s*. 6*d*. For the Divinity Class only, 10*s*. 6*d*.

(2.) The Divinity Class is free to all Students attending any other Class.

(3.) For any four Classes £5 5*s*. For five Classes £6 11*s*. 3*d*.

(4.) In the case of several Gentlemen entering from one Firm or Company, the following will be the fees:—

	For any single Course.	For any four Classes.
If more than five in number,	£1 6 3 each person.	£4 7 6 each person.
If more than ten in number,	1 1 0 „	3 10 0 „

5. After Christmas, the Fee is reduced to £1 1*s*. for One Class; and to £3 10*s*. for Four Classes. The Fees for the Summer Course are the same.

6. Students of this Department have the privilege of becoming "Matriculated Students of King's College, London," by payment of an additional fee of £3 11*s*. This includes the cost of the College Cap and Gown. Students who matriculate in any one year are retained on the list of Matriculated Students in subsequent years, provided they enter to at least two classes.

7. All Fees to be paid upon entrance. It is important to the College authorities that the entries for each Session should, as far as possible, be made a few days before the day fixed for the commencement of the course, in order that the necessary arrangements as to Lecturers and Lecture-rooms may be properly made; but Students may enter at any time during the Course.

8. A Letter of Introduction, from the Clergyman of the District, from the Student's Employer or the Head of his office, or from some other known person, is, in every case, required upon entrance.

9. The following is the Time Table for the next Winter Course:—

	Monday.	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*
6 to 7	Mechanics. Writing. Geography.	*Mathematics. *English. *Italian.		Mechanics. Writing. Geography.	*Mathematics. *English. *Italian.
7 to 8	Latin. Commerce. *German. Chemistry.	*Mathematics. *English. Anglo-Saxon. *Italian. *French. Drawing. *Spanish.	†Divinity.	Latin. Commerce. *German. Chemistry.	*Mathematics. *English. *Italian. *French. Drawing. *Spanish.
8 to 9	Greek. *German. Arithmetic. Dutch. Botany.	*French. History. Anglo-Saxon. *Spanish.	Exp. Sciences. Physiology.	Greek. *German. Arithmetic. Dutch. Zoology.	*French. History. *Spanish.

* Students in these subjects may attend either hour on the two appointed evenings; or may take their two hours on one evening; or by the payment of an additional sum of £1 1*s*. (14*s*. after Christmas) may attend both hours on both evenings.

† Matriculated Students are required (unless specially exempted) to attend the Divinity Class on Wednesday Evening.

10. The Library of the College is open for the purposes of study to all Gentlemen joining any of these Classes, from 5.30 to 8 every Monday, Tuesday, Thursday, and Friday, without additional fee.

Associates and Students of the regular Departments of the College are admitted t the Library, during the evening, on payment of 10*s.* 6*d.* each.

11. Names of the Gentlemen who give instruction in these Classes:—

1. *Divinity*	Rev. Professor PLUMPTRE, M.A.
2. *Latin*	Rev. C. U. DASENT, M.A. Rev. A. I. Mc CAUL, M.A. JOHN LAMB, Esq. Rev. W. HOWSE, M.A.
3. *Greek*	Rev. C. H. O. DANIEL, M.A. Rev. A. I. Mc CAUL, M.A. JOHN LAMB, Esq. Rev. W. HOWSE, M.A.
4. *French*	Professor MARIETTE, M.A. Mons. STIEVENARD, Mons. THIBAUDIN, Mons. ISNARD.
5. *German*	Rev. Dr. WINTZER, Herr SCHNEIDER.
6. *Italian*	Professor PISTRUCCI.
7. *English Language and Composition*	HENRY MORLEY, Esq. A.K.C. Rev. O. ADOLPHUS, M.A.
8. *Anglo-Saxon*	HENRY MORLEY, Esq.
9. *History of England*	Rev. HENRY WACE, B.A.
10. *Geography*	WILLIAM HUGHES, Esq. F.R.G.S.
11. *Arithmetic and Book-keeping*	JAMES HADDON, Esq. M.A.
12. *Writing*	J. W. LE JEUM, Esq.
13. *Mathematics*	Rev. W. HOWSE, M.A. JAMES PIERCE, Esq. M.A. Rev. T. S. CARTE, M.A.
14. *Principles of Commerce*	Professor LEONE LEVI.
15. *Drawing*	Professor DE LA MOTTE.
16. *The Elements of Chemistry*	Professor C. L. BLOXAM.
17. *Mechanics*	Rev. T. A. COCK, M.A.
18. *Physiology*	JOHN HARLEY, Esq. M.D.
19. *Botany*	Professor BENTLEY, F.L.S.
20. *Experimental Physics*	Professor MAXWELL, M.A.
21. *Spanish*	Don B. B. AGUIRRE, B.A.
22. *Dutch*	Dr. KÖSTER.
23. *Zoology*	Professor RYMER JONES, F.R.S.

12. THE FOLLOWING WILL PROBABLY BE THE COURSE FOR THE SUMMER SESSION, 1862:—

Monday.	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*
Chemistry. Greek. German. Botany.	Mathematics. Italian. Spanish. Handwriting.	English.	Nat. Philosophy. French. Arithmetic. Zoology.	Latin. Handwriting.

The Hour of Meeting will be 6.30 P.M.; each Class will last one hour and a half.

The Fee for each separate subject will be 1*l.* 1*s.*; for Four Classes, 3*l.* 10*s.*; for Five Classes, 4*l.* 4*s.*

13. Prizes and Certificates.

1. At the close of each Winter Session, examinations are held in each subject; Prizes, and Certificates of Honour and Merit are then given.

2. A Prize will be given to each of the first 5 Students who gain the highest aggregate number of Marks in all the subjects, (not exceeding 5 in number, of which Divinity must be one), which they respectively bring up for examination at the end of the Winter Session; provided only that no prize will be given for a less aggregate than 300 marks.

3. In each Class for which not less than 10 Students have entered, there will be offered:—

a. A Prize (or Certificate of Honour at his option) to the Student who shall be highest in the examination. For a special rule affecting Prizemen of a previous year, see the Calendar.

b. Certificates of Merit (One Certificate to each of the Students next in succession who shall gain not less than three-fifths of the marks allotted to the subject).

4. Whenever a Class is divided into two or more divisions, each division will be treated as a distinct Class, as regards Prizes and Certificates.

5. There is also an examination on each subject at the close of each Summer Session, and Certificates of Merit are then given to all who obtain three-fifths of the whole number of marks.

6. The Prizes and Certificates are open to ALL Students of the Evening Classes.

7. No Prize or Certificate can be awarded, unless earned by—

a. Regular and punctual attendance. *b.* Good conduct. *c.* Absolute merit in the examination.

8. The highest number of marks assigned to each subject is 100. The standard for "absolute merit," which alone will carry a Prize or Certificate of Honour, will be 75. The standard for "Certificates of Merit" is 60.

9. Certificates of having obtained a College Prize, made out under the signatures of the Principal and Secretary, may be obtained by application at the College Office. Fee 2*s.* 6*d.* for each Certificate.

14. Scholarships and Prizes open to all Matriculated Students of the College.

For the conditions on which such Scholarships and Prizes are open to Matriculated Students of the Evening Classes, see the King's College Calendar.

15. The Associateship of King's College, London.

Rules under which this rank is granted to Students of this Department.

A. Regular and punctual attendance on twelve Courses of Lectures, in addition to three Winter Courses of Divinity.

1. The twelve Courses may be taken in any number of subjects taught in the Evening Classes of King's College, being not less than two.

2. A Student must attend at least two Courses in each Winter Session.

3. The attendance must extend over a period embracing at least three Winter Sessions, except in the case of Students entering after Christmas, who may reckon their *time* from the beginning of the Winter Session.

4. Credit will not be given for an attendance on more than four Classes, exclusive of Divinity, in any one Session.

5. The Matriculation Fees (£3 11*s.*) must be paid at the commencement of the first Winter Session.

6. In the case of Students who begin their attendance after Christmas, an attendance on two Courses during the remaining half Session will be held to be equivalent to one Course during the whole Winter Session.

7. The foregoing regulations apply to Courses of Lectures held during the Winter Session; but an attendance on two courses during a Summer Session will be reckoned for one Winter Course.

B. Good conduct throughout the time occupied by the Student's attendance.

C. Attendance at the College Chapel on Sunday Morning during the time that the Student is attending the Evening Classes, unless specially exempted by the Principal.

D. Gaining during the course of time occupied in attendance either

(1.) A Prize;

or (2.) A Certificate of Honour;

or (3.) Two Certificates of Merit. This rule applies to Certificates gained in the Winter Session; but two Certificates gained in a Summer Session will be allowed for one Winter Certificate.

E. Gaining at least half marks in an examination to be held at the time of applying for the Associateship.

(1.) In Divinity.

(2.) In any other three of the subjects taught in the Evening Classes of King's College; these to be selected by the Candidate himself.

F. For the privileges of an Associate, see the King's College Calendar.

G. Students intending, at any future time, to apply for the Associateship, must take out at the close of their first Session a Schedule, on which the fact of their attendance in each class will be recorded. See Calendar.

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16. Further information may be obtained, and Fees paid, at the Secretary's Office, from 10 to 4 daily; also in the Library of the College, after the commencement of Lectures, from 6 to 8 P.M. on Monday, Tuesday, Thursday, and Friday.

17. The Principal, as a general rule, will be ready, after the commencement of the Course, to receive Students for the purpose of registering them upon the College Books, at 6.45 on Tuesday and Thursday evenings.

A detailed Syllabus of the Lectures given during the Winter Session will be found in the College Calendar, price 2s. 6d., or 3s. per post; OR IT MAY BE OBTAINED IN A SEPARATE FORM, PRICE TWOPENCE, *or Threepence per post. Apply to* J. W. CUNNINGHAM, Esq. *King's College, London.*

N.B.—The next term will begin on Thursday, September 18, 1862.

KING'S COLLEGE, LONDON.

The School.

Head Master.—REV. J. R. MAJOR, D.D.

Vice-Master.—Rev. J. Fearnley, M.A.

Assistant Masters.

T. S. Carr, Esq. M.A.	Rev. Otto Adolphus, M.A.
Rev. T. O. Cockayne, M.A.	Rev. T. S. Carte, M.A.
Rev. W. Hayes, M.A.	Rev. J. H. Standen, M.A.
Rev. George Rust, M.A.	Rev. J. D. Kingdon, M.A.
Rev. C. U. Dasent, M.A.	Rev. G. F. Maclear, M.A.

Mathematical Master.—James Pierce, Esq. M.A.
Arithmetical and Second Mathematical Master.—J. Haddon, Esq. M.A.
Writing and Second Arithmetical Master.—J. W. Le Jeune, Esq.
Assistant Writing and Arithmetical Master.—G. E. Morphett, Esq.
French Language.—M. Thibaudin, Master, and M. Wattez and M. Isnard, Assistant Masters.
German Language.—Rev. A. Wintzer, Ph. D. Master.
Geometrical Drawing.—T. Bradley, Esq. Professor.
Landscape Drawing.—P. H. De la Motte, Esq. Professor.
Lecturer on Science.—Charles Tomlinson, Esq.

King's College School consists of two divisions:—

A. The "Division of Classics, Mathematics, and General Literature."

B. The "Division of Modern Instruction."

A.

Division of Classics, Mathematics, and General Literature.

1. This division is intended to prepare Pupils for the Universities, for the Theological, General Literature, and Medical Departments in the College, and for the learned professions.

2. The regular course of Instruction comprises Divinity; the Greek, Latin, English, and French Languages; Mathematics, Arithmetic, Writing; History, and Geography. Hebrew is also taught to the Upper Sixth Class.

3. German is taught, without any additional charge, to Pupils of the sixth, fifth, and fourth Classes, after the regular School hours, on Wednesday, from ½-past 1 to 3, and on Saturday, from 12 to ½-past 1. Pupils of the lower Classes may learn this Language on payment of 10*s.* 6*d.* per term.

4. Instruction in Drawing may also be obtained by all pupils on Tuesday and Friday, after the regular School hours, on payment of 14*s.* a term, including drawing materials.

5. Scholarships.—Two of 30*l.* (one in Classics and one in Mathematics) for three years; four of 20*l.* (one for each division, and two in Mathematics); two of 15*l.*; two of 10*l.* two of 8*l.*; and two of 6*l.*; are annually given, in the Lent Term, to those Pupils who shall pass the best examinations.

Division of Modern Instruction.

1. This Division is placed under the general direction of the Rev. John Fearnley, M.A., Vice-Master of King's College School, assisted by the Rev. J. H. Standen, M.A., T. S. Carr, Esq. M.A., and by the Mathematical, Arithmetical, French, German, and Drawing Masters.

2. The object in view in this Division is to prepare Pupils for general and mercantile pursuits, for the Departments of Engineering, Architecture, and Military Science in the College, for the Military Academies at Woolwich, Sandhurst, and Addiscombe, and for the Royal Navy and the Commercial Marine.

3. Pupils in this Division take corresponding rank with those in the Division of "Classics, Mathematics, and General Literature."

4. The Mathematical Scholarships, of 30*l.* and 20*l.*, are open to pupils in this Division.

5. The regular course of Education in this Division commences with the Lower First Class.

6. In addition to the regular course of Instruction in the Modern Languages, it has been thought advisable to introduce French and German Conversational Classes, with the view of imparting to the Pupil, by the daily habit of conversation, a facility for expressing himself in these languages, and thereby superseding as far as possible the necessity of a residence upon the continent.

7. Separate Classes are also formed, so as to give special extra Instruction, gratuitously, to boys preparing for any of the following; viz.—

1. Commercial pursuits.
2. Military and Naval studies.
3. Engineering and Architecture.

General Rules and Regulations,

Applicable to the whole School.

1. All boys above the Second Class, (the First and Second Classes being common to both Divisions,) will be placed in whichever Division their parents or guardians shall select. Pupils may at any time be moved from one Division to the other.

2. The general age of admission is from nine to sixteen years.

3. The duties of each day commence with Prayers and the reading of the Scriptures in the College Chapel, from which none of the Pupils are allowed to absent themselves.

4. The periods for the admission of Pupils are, the middle of January; the beginning of May; and the middle of September.

Before entering a pupil, the Head Master must be furnished with a *testimonial of good conduct from the applicant's last instructor*, as well as such particulars with respect to his previous studies as may lead to a correct classification.

5. The Hours of attendance are:—

On Monday, Tuesday, Thursday, and Friday, from..... 9 o'Clock to 3.
On Wednesday, from ..... 9 o'Clock to 1.
On Saturday, from ..... 9 o'Clock to 12.

Pupils who are irregular in their attendance, or inattentive to their studies, will be detained one hour longer, under the charge of a Master; and in each case a letter will be sent to the parent or guardian, stating the cause of the detention.

6. The Vacations consist of seven weeks in Summer; one month at Christmas; and five days at Easter. Pupils are expected to attend the School till the Vacations commence, and to return punctually when they close.

7. There is annually, previous to the Summer Vacation, a public distribution of Prizes awarded by the Council. Examinations for places in the Classes, for promotion, and for Prizes, take place each Term.

8. A Register is kept by the Head Master and the other Masters, of the attendance, employments, and general conduct of the pupils; of which periodical reports are transmitted to their friends.

9. Instruction may also be obtained within the College, in Italian, Chinese, Hindustani, Fencing, Singing, and Dancing.

10. A course of eight elementary Lectures is given each term to each Division, on some subject connected with Art or Science.

11. The terms for the whole regular course of Instruction, in either Division, *including Stationery and the use of Books*, are 7*l.* 15*s.* 2*d.* per Term. There are three Terms in each year.

12. Upon entrance, the Fees for the first two Terms must be paid in advance, together with the sum of 2*l.* 3*s.* 6*d.* for Entrance Fees, for the use of a Box, and for the College Calendar; amounting altogether to 17*l.* 13*s.* 10*d.* All fees are payable in advance.

13. Upon entering the Sixth Class, each Pupil is called upon to contribute Ten Shillings to the School Library.

14. *Books.*—The Council having resolved to establish the system of Loan with regard to books, no Boys will be permitted, except those in the Upper Sixth Class, or under unusual circumstances, to bring their own books to the School.

15. A sufficient time, at 1 o'clock each day, is allowed for luncheon, which is provided in the College at a regulated expense.

Those parents who may wish their sons to dine at this hour, may avail themselves of an arrangement made for this purpose in the College Hall. One of the Masters always presides. The expense of dinner is—

£4 5*s.* per Term, for six days in the week.
£3 0*s.* ,, for the Monday, Tuesday, Thursday, and Friday in each week.
0 1*s.* 3*d.* per diem for a single dinner.

N.B. It is earnestly requested that parents will, as far as possible, adopt the system of taking out tickets for four or six days, as the case may be, at the beginning of each term, instead of allowing their sons to make daily payments.

16. Pupils who have been in the School two years, and before leaving it have reached the Upper Sixth Class, are entitled to be recommended for election as Associates of King's College, London, after two years' study in the General Literature, or Applied Sciences Departments of the College, instead of after three years as in all other cases.

17. Pupils may reside with their parents or friends. The following Masters receive Boarders on terms sanctioned by the Council, which may be learnt on application to them, or at the Office of the College:—

Rev. J. R. Major, D.D. 42, Bloomsbury Square.
Rev. T. O. Cockayne, M.A. 17, Montague Street, Russell Square.
Rev. George Rust, M.A. 31, Bedford Square.
Rev. C. U. Dasent, M.A. 14, Spencer Road, Putney, S.W.
Rev. O. Adolphus, M.A. Palace Square, Sydenham.

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18. EXTRA INSTRUCTION,

After the regular School hours, may be obtained in the following subjects:—

		Per Term. £ s. d.	Per Ann. £ s.
German	Rev. A. Wintzer, Ph.D.	See page 30.	
Drawing	Prof. De La Motte	See page 30.	
Fencing	Professor H. C. Angelo	1 11 6	4 4
Drilling	ditto	0 10 6	
Dancing	Edmund Goodwin, Esq.	1 11 6	4 4
Singing	Professor Hullah	1 1 0	
Workshop	G. A. Timme, Esq.	1 1 0	
Photography	George Dawson, Esq.	See page 11.	

N.B. No Pupil can be admitted to any of these Classes without producing the College Ticket, signed by the Secretary.

Extract *from the* Charter *of* King's College, London.

"That the Council shall have power to accept, on behalf of the said College, gifts and endowments for promoting particular objects of education, or otherwise, in aid of the general purposes of the College, on such terms and conditions as may be agreed on, for the purpose, between the Council and the person bestowing such gifts or endowments."

N.B. The Council will be very glad to receive, under the foregoing clause of their Charter, any sum that may be offered to them for the endowment, in whole or in part, of any particular Scholarship or Professorship.

FORM OF BEQUEST TO KING'S COLLEGE, LONDON.

"I give to the Corporation of the 'Governors and Proprietors of King's College, London,' the Sum of
Pounds, (for the general purposes of the said Corporation, or for the foundation of Scholarships and Prizes, open to the whole College, or limited to any particular Department,) to be paid exclusively out of such part of my Personal Estate as I can lawfully charge therewith; and I desire that the said Sum of Pounds be paid, free of all deductions, be the Treasurer for the time being of the said Corporation, whose receipt shall be a full and sufficient discharge for the same."

N.B. Information may be obtained from the Principal or the Secretary as to the particular Endowments most needed by the College, and as to the best regulations to be enacted for securing the objects of the Donor.

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NOTICE.

ENLARGEMENT OF THE ARCHIVES.

Four Numbers are now published in the year, at the price of 2s. 6d. each.

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The number of pages and illustrations in the Journal will be increased in proportion to the number of subscribers.

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All Subscribers to this Journal are requested to forward their names to the Editor.

TO AUTHORS AND CONTRIBUTORS.

In Number VI a short analysis of the Contents of the different Works sent to the Editor was given. It is proposed to continue this system. The few remarks offered will be purely *analytical*. *Critical* notices are inadmissible. If the authors of original papers and essays will transmit to the Editor a brief and simple summary of the results to which they have arrived, with their printed communication, this department of the Journal will be rendered more complete. Pamphlets and short papers, English and Foreign, on subjects connected with medicine and surgery, which are not generally noticed in reviews, will be included in the summary.

Copies will be forwarded on the morning of publication, post free, to gentlemen who send their addresses, accompanied with a remittance for their subscription, addressed to the Editor, King's College, London.

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No. XII, forming the fourth and concluding Number of Vol. III, will be published on July 1st, 1862, with copious Index to Vols. I, II, and III.

All communications to be addressed to the Editor, King's College, Strand, London, W.C.

Annual Subscription, payable in advance, 10*s.*